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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

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THE UNIVERSITY OF ALBERTA

KARMØY, NORWAY: THE IMPACT OF ALNOR ALUMINUM A/S

by

© WILLIAM RAY TOWLE

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF ARTS

DEPARTMENT OF GEOGRAPHY

EDMONTON, ALBERTA

SPRING, 1970

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled Karmøy, Norway: The Impact of Alnor Aluminum A/S

submitted by William Ray Towle

in partial fulfilment of the requirements for the degree of Master of Arts

ABSTRACT

This thesis is an examination of the impact of a large aluminum plant on Karmøy, an island situated along the outer coastline of southwestern Norway. Within the introduction, a comparison of other associated industrial communities leads to the development of a number of hypotheses of expected change. These hypotheses are then tested to determine the conformity or disconformity of the Karmøy example to the standard changes. Primary considerations are the shifting spatial patterns; i.e. the journey to work of the labor force, the location of new housing and retail establishments, the provision of social services, and the boundaries of the administrational units. These spatial patterns are examined over the time span corresponding to the planning, construction, completion, and subsequent production of aluminum. The degree to which the Alnor plant and its employees are directly responsible for the changes is a major focus. Of special interest is the delimitation of the commuter field of the Alnor employees and their previous occupations and residences. This is useful when considering the current trends of regional planning in Norway. The information was obtained from a questionnaire mailed to a random sample of the Alnor employees.

The Karmøy study showed a marked shift from the norms. Alnor was built within the more populated outer islands rather than at the head of a fjord nearest the source of power. A new "industrial" town did not develop because the labor force was recruited from Karmøy. The proximity of a large service centre and the implementation of dispersed planning programs by the numerous individual localities discouraged the

development of agglomerations near the industrial concern. In essence, the scattered settlement pattern was retained as a direct result of the local recruitment of labor and the relatively well-developed transportation facilities.

Although Alnor employs the greatest number of industrial workers on Karmøy, it is not the only major source of livelihood nor the controlling factor in the district's economy. Only one-tenth of the total wages paid out to the labor force on Karmøy went to Alnor employees and the increased building boom, i.e. single-family dwellings, was a direct result of Alnor employees in only one out of every five cases.

Geography as an individual subject or specialization has only recently been introduced within the framework of education in Norway. Therefore, the number of academic studies with a geographic focus has been rather limited. Hopefully, this thesis will contribute to the growth of geographic literature within, and concerning, Norway.

ACKNOWLEDGEMENTS

I would like to express my utmost thanks to the Karmøy inhabitants who assisted me in every possible way during the months of research. Without their cooperation, this study would have proved much more difficult and probably would not have been possible. More specifically, I would like to thank Mr. A. Hoff-Eriksen, Mr. P. Eliassen, and Mr. A. Vaage of Alnor Aluminum A/S; Mr. Arne Gunnerud, chief planner of Karmøy; and Mr. Sigmund Nes, secretary of the town council at the city hall in Åkrehamn. Their interest in my study and hospitable response to my numerous queries and subsequent correspondence was highly beneficial.

Other individuals in Norway who aided my research included Professor Axel Sømme and Professor Hallstein Myklebost at the Norges Handelshøyskole in Bergen. They gave me access to their library facilities within the Geografisk Institutt and initially helped me to contact the desired personnel in Karmøy.

To my thesis supervisor, Dr. W.C. Wonders, I express my thanks and gratitude for guidance throughout my years at the University of Alberta. He gave me the impetus and opportunity to pursue an interest in Scandinavia which subsequently resulted in my spending two summers of study in Norway. The valuable and constructive criticism greatly improved the quality of the text.

I would also like to thank Dr. B.M. Barr for his interest in my thesis and for the useful suggestions with regards to the thesis topic and research technique.

Mange tusen takk to Miss M. Wells, lecturer of Scandinavian at the University of Alberta, who spent many hours translating some of the Norwegian literature.

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TABLE OF CONTENTS

TITLE PAGE

ABSTRACT iii
ACKNOWLEDGEMENTS v
TABLE OF CONTENTS vii
TABLES viii
FIGURES ix
GUIDE TO NORWEGIAN PRONUNCIATION AND TRANSLATION xi
INTRODUCTION xii

CHAPTER

I KARMØY: ITS SETTING 1
- Settlement 3
- Economy and Livelihood 6
- Administration 7

II THE NORWEGIAN ALUMINUM INDUSTRY 10
- Alnor Aluminum A/S 13

III THE ADMINISTRATION OF KARMØY 18

IV THE ALNOR LABOR FORCE 25

V IMPACT OF ALNOR ON THE COMMUNE OF KARMØY 34
- Impact on Population and Migration 34
- Impact on Settlement 36
- Impact on Business Establishments and Commercial Activities 43
- Impact on Community Services 47
- Impact on Land Use 49
- Impact on the Karmøy labor force 52

VI CONCLUSION 54

BIBLIOGRAPHY 61

APPENDIX 68
- Questionnaire to Alnor Employees
- Explanation of Sampling Technique

TABLES

TABLE — ON OR FOLLOWING PAGE

I Functional Classification of Urban Settlements on Karmøy 4

II Resident Population by Industry, 1960 6

III The Size and Population of Karmøy Communes, 1960 8

IV Previous Employment of the Alnor Employees 28

V Population Growth of the Communes in North Rogaland, 1960-1968 33

VI Population Growth of the Communes on Karmøy, 1960-1969 34

VII Average Income for Personal Taxpayers in Karmøy 41

VIII Building Applications in Karmøy, 1963-1968 44

IX Inadequate Community Services as Expressed by Alnor Employees 48

X Aspects of Agriculture on Karmøy, 1959, 1969 50

XI Karmøy Labor Force, 1960, 1968 52

FIGURES

FIGURE — FOLLOWING PAGE

1 General Location Map. Norway xi

2 Physiography 1

3 Bedrock Geology 2

4 General Location Map. Karmøy 3

5 An Example of the Scattered, Linear Settlement Pattern 5

6 Karmøy Communes 1960 7

7 Communes According to Schei-Committee Proposal of March 23, 1957 20

8 The Commune of Karmøy 21

9 Current Residences of Alnor Employees 25

10 Travel Time to Alnor by Car (In Minutes) 26

11 Travel Time to Alnor by Alnor Buses (In Minutes) 26

12 Proportion of Alnor Employees Travelling By Car and By Bus 27

12b Number Employed at Alnor by Age Group 29

Number of Applications to Alnor Through the Employment Agency as of June 10, 1967

13 Unemployment on Karmøy, 1960-1969 30

14 Previous Residences of Alnor Employees Who Have Migrated to Karmøy 32

15 Net-Migration in the Commune of Karmøy, 1960-1968 35

16 Proposal for Future Expansion by Andersson & Skjånes 37

17 The Location of the Building Sites for Single-Family Dwellings 37

FIGURES (Cont'd)

FIGURE		FOLLOWING PAGE
18	Population of Karmøy and Haugesund, 1960-1969	39
19	New Housing Divisions	42
20	Karmøy Waterworks	49
21	Karmøy Land Use, 1969	49

GUIDE TO NORWEGIAN PRONUNCIATION AND TRANSLATION

The definite article is either "-en", "a", or "-et" and is suffixed to the noun. For example, Vestlandet means "the west land".

et = the
vest = west
land = land

"er" at the end of a word denotes plural, e.g. kroner - crowns

There are three additional letters in the Norwegian alphabet - "ae","ø", and "å".

"ae" - sounds like "a" in mad or "ai" in lair.
"ø" - sounds like "ir" in bird or "u" in trust. Similar to German "ö" and French "eu".
"å" - sounds like "o" in horse or coat.

Other letters or letter combinations requiring explanation include:

"y" - sounds like "ee" in see or "i" in Sid. It is between "i" and German "ü" (French "u").
"sj"- sounds like "sh" in shoe.
"au"- sounds like "ou" in ouch.
"øy"- sounds like "uoy" in buoyed.

Listed below are a few place name translations.

Karmøy - Karm island.

Skudeneshavn - Skudenes harbor.

Øvre Årdal - upper Årdal.

Norheimskogen - the Norheim forest

Vorråfeltet - the Vorrå field

Førdesfjorden - the Førdes fjord.

A/S- Limited

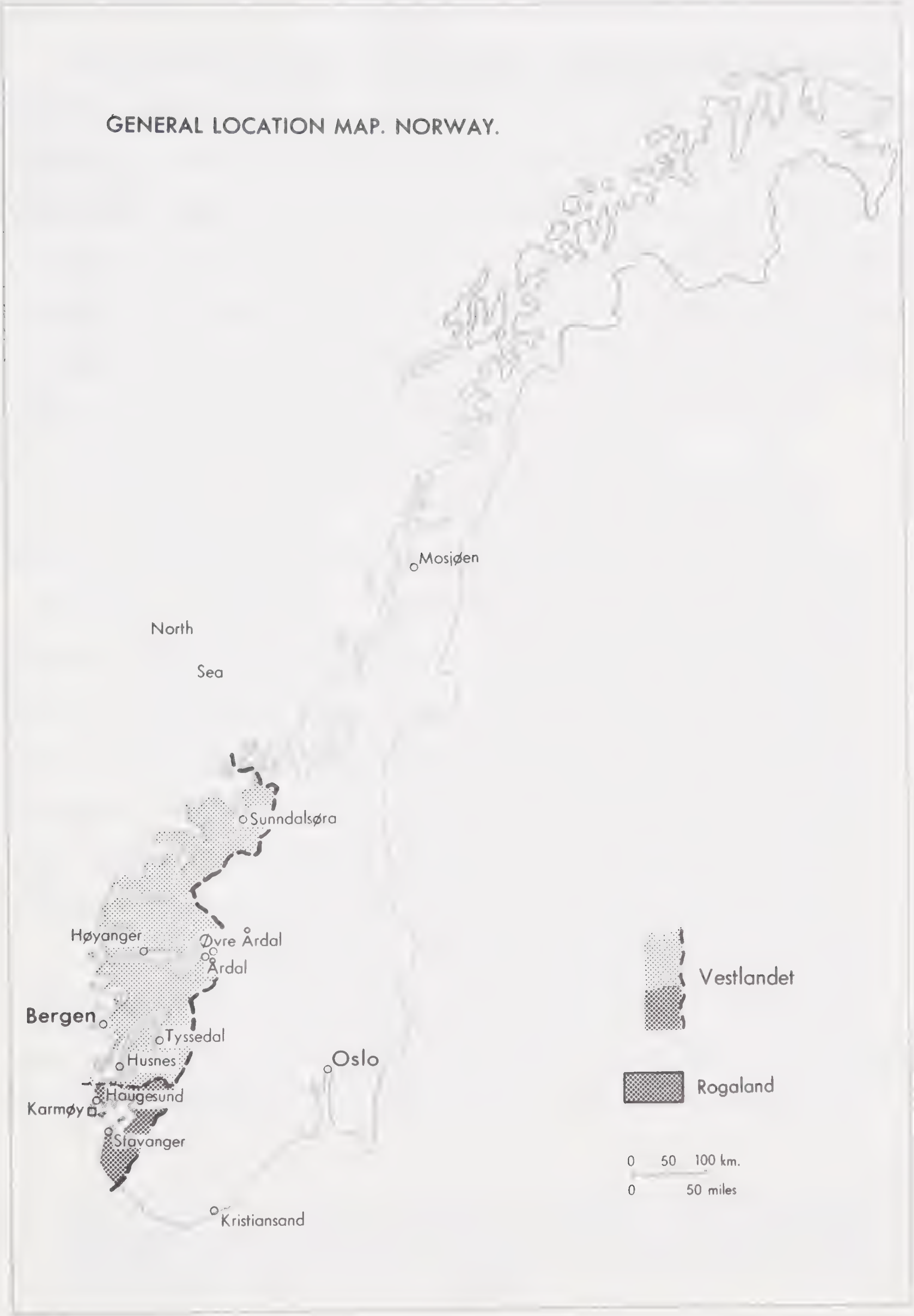
GENERAL LOCATION MAP. NORWAY.
Mosjøen
North
Sea
Sunndalsøra
Høyanger
Øvre Årdal
Årdal
Bergen
Tyssedal
Husnes
Oslo
Haugesund
Karmøy
Stavanger
Kristiansand
Vestlandet
Rogaland
0 50 100 km.
0 50 miles

Figure 1

Introduction

The aluminum industries in Norway are examples of aluminum smelting companies seeking out fringe areas where low-cost power can be developed. Production in Norway is chiefly for export and is based on hydroelectricity with imported alumina. What happens when an electro-industry*, such as an aluminum plant, is located in a community on the west coast of Norway? The hypotheses in answer to this question can best be derived by studying the effects of industry, in general, on a community and then referring to the already existing electro-plants in that region and particularly, the aluminum-based communities.

The impact of an industrial concern on a community or locality depends, amongst other things, upon the previous nature of the particular community in question as well as upon the individual character of the industry itself. The industrial base imparts to the vicinity a character relating to the particular types of production. These shape the life-cycle of the community and result in the development of the community's own unique identity or ethos. There are striking differences between cities built for the purposes of administration as opposed to those whose livelihood is a result of an economic base relating to heavy-industry.

It can be said that industry generally favors certain pre-existing communities because of their location and shapes their growth patterns so that, in effect, the size of the community is proportional to the size of the industrial base. In a similar manner, industry affects the local

---

* electro-industry - under this heading are included the electro-chemical and electro-metallurgical industries. These are power-intensive industries whereby the electric current is partly used in an electrolytic process and partly for smelting.

land-use pattern since the other land uses (e.g. transportation, residential, retail, agricultural, etc.) are affected by the industrial land use. The local impact of a new plant introduces complex problems in traffic flow, in the distribution of the utility systems, in the provision of adequate housing, in the crowding of schools, etc. Increasing the various amenities also means additional expenditures for the local government. There are added demands and competition for local materials, land, labor, transfer services, local services, as well as an increase in the demand for consumer goods and services of all kinds. Some immediate economic effects may include a tightening of labor and real-estate markets reflected perhaps in rising labor costs, rents for other businesses, and the price of local materials.[1]

The earliest and perhaps the most devastating impact of industry on the countryside occurs during the construction of the plant when changes within the community are exceptionally rapid. The great increase in population due to in-migration of construction workers and employees results in overcrowding existing facilities. This subsequently results in repercussions at all levels of the local government structure since previous policies and plans for the implementation of various services are no longer applicable. Complete regional transformations occur in the extreme cases when large industrial concerns are sited in remote areas.

A well-established generalization associated with economic modernization is the shift from agricultural to non-agricultural activities (or "sectoral relocation")[2]. In rural areas an adequate supply of skilled

---

[1] Edgar M. Hoover, The Location of Economic Activity. McGraw-Hill, New York, 1948. p. 152.

[2] Wilbert E. Moore, The Impact of Industry. Prentice-Hall, Englewood Cliffs, New Jersey, 1965, p. 63.

labor is unlikely to be found in the immediate vicinity of the construction project so as a result, there is an in-migration to the locality where anticipated better economic opportunities are available. Industrialization implies the increasing of the proportion of workers employed in manufacturing and services. Types of retail services, churches, schools, and other facilities, respond to the particular occupational composition of the community[3].

In an area of expanding industry, services usually arrive in the following order:

(1) services related to the industrial installation itself such as sewage and water supply.

(2) similar services on housing estates so houses can be built.

(3) the improvement and extention of transportation facilities.

(4) the improvement and extention of educational facilities, library services, and health clinics.[4]

Thus, due to the influx of the industrial population, the previous inhabitants of the district benefit as well and such benefits arrive earlier than they otherwise might have done. This is also indicated by the fact that for every new employee, ultimately one service job is created, particularly in retail trade and services.[5] If each new

---

[3] William H. Form, Delbert C. Miller, Industry, Labor, and Community. Harper and Brothers, New York, 1960. p. 11.

[4] Dr. H. E. Bracey, Industry and the Countryside. Faber and Faber, London, 1963. pp. 132-133.

[5] Form, op. cit., p. 27.

employee had an average family size of three, a six-fold increase in the population results. This increases the demand for retail services which in turn increases the availability and types of marketable goods.

Industrialization appears to be an essential ingredient for substantial economic growth. However, successful industrialization is a continuous and not merely a transitional change. The technological changes which result from the introduction of industry induce an organizational change in the community. As a result, a community undergoing successful industrialization is constantly changing its organizational structure (administrative, social, etc.)

The spatial patterns which characterize different industries are a combination of economic considerations, socio-historical factors, and happenstance.[6] As a result, the search for uniformities in the impact of industry cannot be totally successful in view of the facts of variability. Because of this, an analysis of the probable impact of a particular industry on a community will be handled best by looking at the impact of similar industrial concerns in a similar type of geographical location.

The clue to the pattern of distribution formed by the electro-industries lies partly in history, partly in the transmission technique and economy, and partly in the physical geography.[7] At the turn of the century, they were built close to the power plants because great losses of power would occur if the electricity was transported over any great

---

[6] Richard J. Gonzalez, "Production Depends on Economics, Not Physical Existence", Readings in Economic Geography. Wiley and Sons, New York, 1967. p. 353.

[7] Axel Sømme. A Geography of Norden. John Wiley and Sons, New York, 1960. p. 274.

distance. They also were located close to the ocean for the import of raw materials and export purposes. In Norway, this resulted in the building of the electro-industries at the heads of the fjords nearest the sources of power. However, such locations have not yet developed into industrial concentrations of any great size. The inadequacies of electric energy in meeting the full range of industrial requirements for other industries, including fuel as well as power, seem to indicate that centres possessing only electric energy from water power will not readily develop the wide range of industrial interests that are common in many older types of locations.[8] Thus, this has resulted in the development of "one-company" towns whereby the inhabitants are almost totally dependent on one industrial concern for their livelihood. This construction and building of completely new towns is highly manifested in Vestlandet or western Norway. Due to their remote location, these towns are costly to equip and service because they are far from the nearest commercial centres. The lack of a more diversified industrial base results in a static work force and within a half-generation the number of would-be workers greatly exceeds the number of jobs. This results in out-migration and stagnation in the growth of the community. These industrial localities can be termed "one-sided" industrial communities because continued expansion and growth depends on the expansion of the present establishment. It is difficult to get alternative activities. The dominant industrial concern monopolizes the employment market and therefore, prospects of the arrival

---

[8] R. C. Estall and R. Ogilvie Buchanan. Industrial Activity and Economic Geography. Hutchinson University Library, London, 1961. pp. 64-65.

of new industrial undertakings is lessened due to the existence of the negative environment of expected high wages for labor or the absence of another resource.

When an industry is established in a remote area where a new service centre would be built along with the plant, then the growth of the service industries is not great relative to the growth in employment and population.[9] Poor communications and a modest customer base hinders the expansion of the service businesses.

The study of the one-sided industrial locality must also include an assessment of its omland* or hinterland. The omland size depends on the size of the centre and the accessibility to this centre. Districts of one-sided industrial communities have large geographical areas and little population. For example, the aluminum community of Årdal, including its omland, has a population of only 25,800 with industry employing 1800 or 7 percent of the district's total population.[10] In addition, there are those who are indirectly tied to the industry such as teachers and merchants. Because of their small population, such centres have difficulty enlarging and/or maintaining a satisfactory service centre for themselves or their omland. Thus, the industrial employment and the total number employed in service businesses stagnate or decline. Between 1950 and 1960, the work force of Øvre Årdal declined from 49 percent to 43 percent of the total population.[11] In the same decade, the established aluminum

---

[9] Pers. comm. Paul Olav Berg, Oslo.

[10] Jens Chr. Hansen. "De ensidige industristeder og deres plass i bosetningsmønsteret." Saertrykk av Plan og Arbeid. Oslo, 1967. Nr. 1-2, p. 9

[11] Ibid., p. 4.

* Omland - synonymous to the Swedish umland.

towns of Tyssedal and Høyanger decreased in total population while those that started production, such as Sunndalsøra and Mosjøen, topped the list with regards to the expansion and population of Norwegian communities. It is inevitable that this explosive growth will be followed by a long period of slow growth and stagnation unless, of course, there is further expansion of the aluminum plant itself. The average population of the aluminum-based towns in 1960 was only 3,150.[12]

So far, most Norwegian tettsteder*, regardless of size and type, are growth points in a spread settlement pattern which is presently amalgamating into agglomerations.*[13] The traditional ways of life such as farming and fishing have difficulty withstanding the competition for the work force of new industry. The flight from the land and the sea to the nodal points of industrial locations has changed the patterns of livelihood of the Norwegian people as the processes of the industrial revolution further mature and take hold over the Norwegian landscape.

Consideration of the impact of industry on a community, and more specifically, the impact of electro-industries on the west coast of Norway, has led to the following hypotheses of expected changes:

(1) the building of a "one-company" town within the immediate district, near the aluminum plant.

(2) an increase in population as a result of an increase of in-migration and decrease of out-migration.

---

[12] Ibid., p. 11.

[13] Ibid., p. 7.

*tettsteder - agglomerations of more than 200 inhabitants with an urban occupational structure and urban morphology.

*agglomeration means a place where the residences are normally not farther apart than 50 meters.

(3) a shift in settlement patterns from rural to urban.

(4) a decrease in the importance of agriculture and fishing in the livelihood of the people reflected in associated change in the size and mix of the labor force to one focusing on manufacturing and industry.

(5) a small growth of service industries relative to the growth in employment and population.

(6) an increase in the median family income within the district.

(7) a decrease in unemployment within the district.

(8) improvement and extension of transportation facilities and other community services.

(9) a change in the planning and administration of the community.

(10) in general, initial positive prospects for economic growth and expansion, followed by a period of slow growth and stagnation.

These ten hypotheses will be used as the basis for the organization of the discussion and the analysis of the impact of Alnor Aluminum A/S on Karmøy in southwest Norway. To what degree do the changes that have taken place correspond or differ from these hypotheses? It is expected that at least some variability will be present and the discussion will attempt to explain such divergencies from the norm. Chapter one will provide a description of the geographical location of Karmøy and give the setting for the purposes of examining the conditions of settlement. A brief history of the region will identify the past industrial trends.

Chapter two will review some characteristic features of the Norwegian aluminum industry and Alnor Aluminum A/S. Changes that have taken place in the planning and political organization of Karmøy will be accounted for within chapter three. The patterns of the industrial work force will be discussed and analyzed in terms of residence and place of work in chapter four. Also included will be the change, if any, of the employment-unemployment ratio. The fifth chapter will discuss the changes in the population and migration, the settlement pattern, the changes in the social services since the introduction of the concern, any land use changes, as well as the alteration in the size and mix of the labor force. Chapter six, the conclusion, will evaluate the change resulting from Alnor and its conformity or disconformity to the hypotheses.

The majority of studies in Geography which deal with the impact of a particular industry on one or more communities are concerned primarily with changes in the economic base. However, in this particular study, the economic base will be a secondary consideration to the shifting spatial patterns, such as the journey to work of the labor force, the change in the boundaries of the political units, the location of new housing and retail establishments, the provision of social services (amenities), etc.

Field research for this study was carried out during the summer months of 1969. Major sources of information included the Universities of Oslo and Bergen, the Central Bureau of Statistics (Statistisk Sentralbyrå) in Oslo, various agencies within Karmøy such as the city hall (Rådhuset) and the central planning office (Teknisk Etat), and of course, Alnor itself. Most of the interviews and other aspects of personal communication were conducted in English. However, almost all of the

literature and statistical data concerning the study area required translation from Norwegian to English.

A questionnaire* was distributed to a random sample of the Alnor employees. The objective was to locate their current and previous residences to ascertain if there had been an appreciable shift towards, and adjacent to, the aluminum plant. This information would also outline the boundaries of the commuter field - the area in which the labor force of Alnor reside, commuting daily to the industrial concern. This is important when considering the growth centre policy of Norwegian authorities: i.e. would it be more advantageous in regions suffering from depopulation to develop a centre which might provide an alternative to migration, whereby the people move to this centre within the region rather than outside it; or alternatively, by means of local and regional concentration, would it be possible to maintain the broad regional population distribution virtually unchanged? Other questions concerning previous occupations would indicate the degree to which there was a shift in the livelihood of the people and local recruitment of employees. This is useful when analyzing the mobility of labor.

The questionnaire was sent to 298 of the 878 employees at Alnor of which fifty percent were returned. Therefore, answers were received from a random sample of seventeen percent of the Alnor employees. This should provide a representative sample of the major trends in the patterns of livelihood of the industrial work force at Alnor.

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* See appendix.

CHAPTER I

KARMØY: ITS SETTING

Karmøy is located within the administrative boundaries of the county of Rogaland on the southwest coast of Norway (Figure 1). It is the largest island in Rogaland being approximately 30 km.* in length and 9 km. in width. The area is 176.9 sq. km. (68.3 sq. miles). Karmøy lies between 59°08' and 59°25'N. Latitude and between 5°10' and 5°20'E. Longitude. It can be classified as an "outer island" because its western coastline borders directly on the North Sea. The narrow Karmsund Channel (only 0.17 km. at Salhus) separates Karmøy from the Haugesund peninsula which is part of the Norwegian mainland.

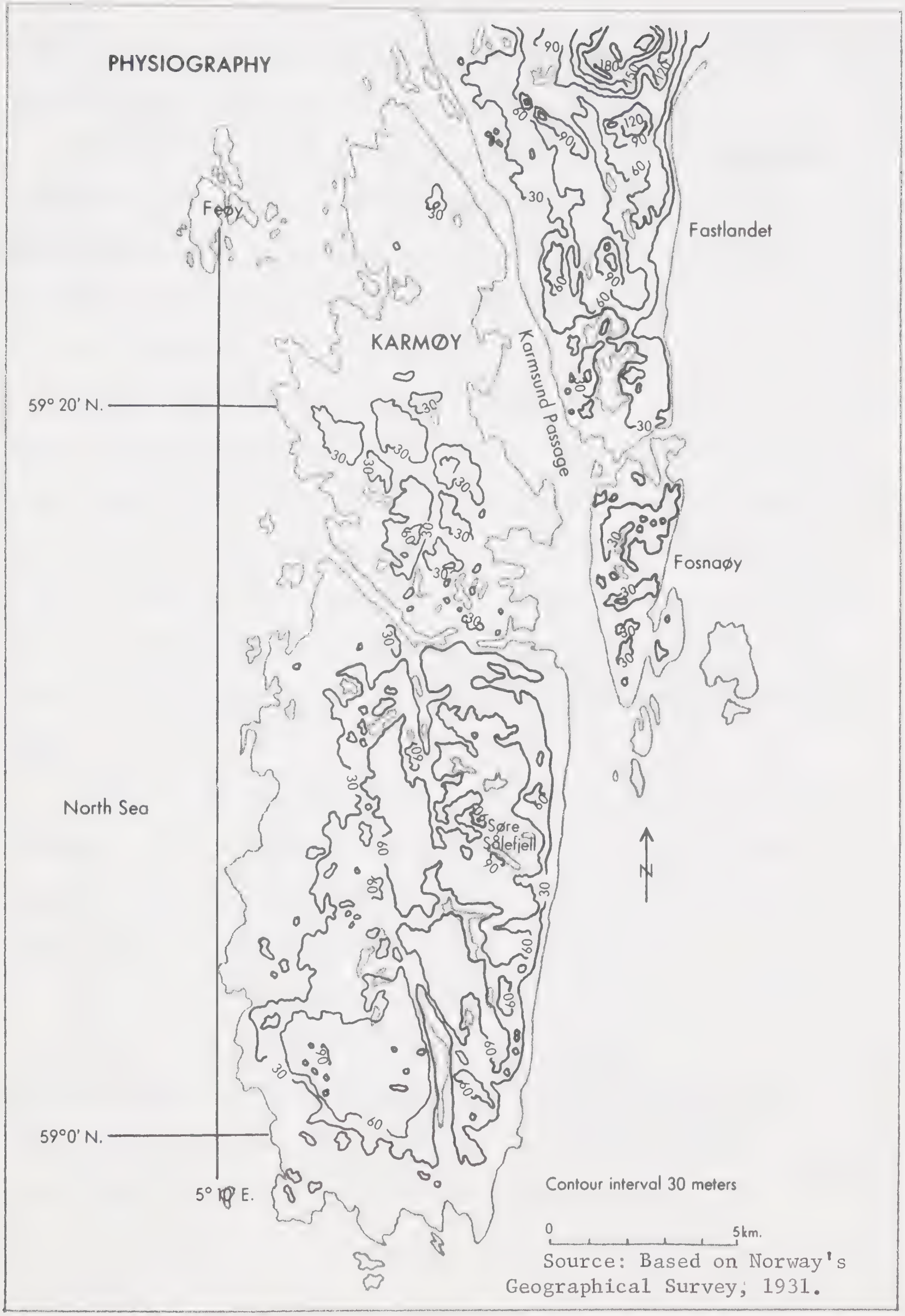
Compared to the rugged, steep-walled fjords which characterize most of Vestlandet, Karmøy is relatively flat, especially in the north where the highest point is 58 meters** above sea level (Figure 2). South Karmøy is more undulating and has many points over 100 meters above sea level - the highest being 132 meters at Søre Sålefjell. A large part of the island is characterized by the strandflat***which is especially marked in the north and along the west coast. Areas of strandflat along the Norwegian coast are limited in extent but are nonetheless important since

---

* 1 km. = 0.62 miles.

** 1 meter = 3.28 feet.

*** The strandflat with its accompanying skjaergård (zone of low rock islands) is closely linked with fjords and glaciation of coastal areas. The origin is uncertain but it may represent a pre-glacial peneplain subsequently trimmed by wave-action at various closely-spaced levels, and modified by ice-erosion.



Source: Based on Norway's Geographical Survey, 1931.

Figure 2

they are the most attractive sites for habitation and settlement. As well as being level, they have the best soil for agriculture.

On the whole, the terrain is rough and irregular, consisting of interspersed hills and "mountains". There are numerous small lakes (about 60 altogether) but no unifying drainage system. The vegetation cover is predominantly heather and small shrubs (heath), interspersed with patches of spruce and pine.

Karmøy consists chiefly of rock schist (shale, slate) in the northeast, gabbro in the middle, and granite in the southwest (Figure 3). South Karmøy has a varying complex of slightly metamorphic sediments and igneous rocks. Besides gabbro there occur conglomerates, "fragmented rocks", sandstone, trondhjemites, etc. In the northern part of Karmøy lie the pyrite mines of Visnes. The Haugesund peninsula itself is essentially basal gneiss with low grade phyllites overlying this to the west.

During the Quarternary Era this area was glaciated by a glacier-movement from the south and later, one from the east. As a result of the glacial erosion and the abrasive action of the sea, a strandflat was formed (as previously mentioned).

According to the Koeppen classification system, the Karmøy region is categorized as having a Cfb climate (warm temperate climate). Along the west coast of Norway the mean temperature in January is more than 15 C°* higher than the mean temperature of the latitude while the mean temperature for the year has a positive thermal anomaly from 7 to 12 C°

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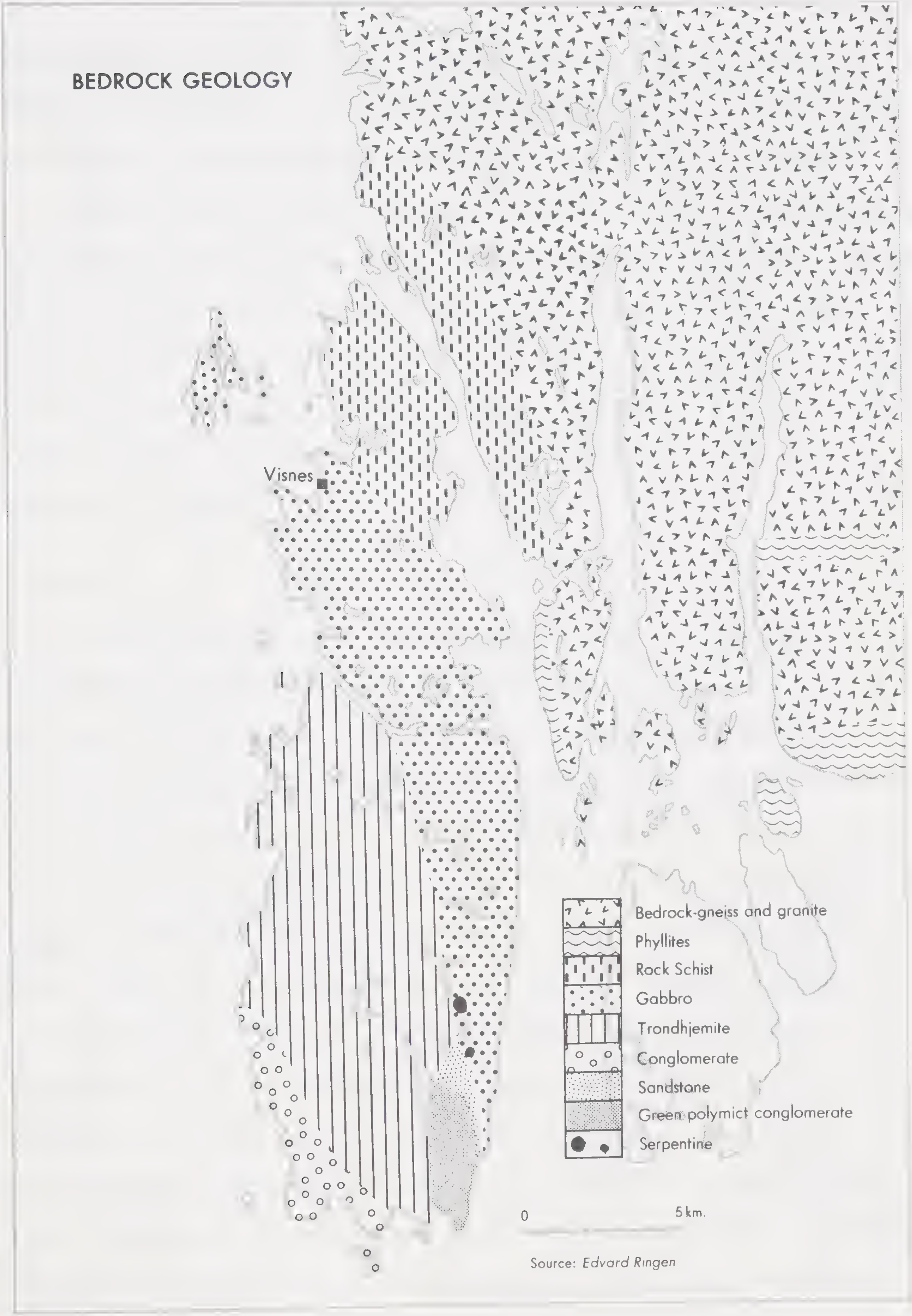
* 1 C° = 1.8 F°.



Source: *Edvard Ringen*

Figure 3

due to the North Atlantic Drift. Precipitation is high but less than further inland where there is much greater relief and thus, more precipitation due to greater orogenic uplift of the air masses, i.e. Bergen.

The west coast of Norway is in the path of the North Atlantic cyclones and therefore is subject to frequent gales and changes in weather. Because of the relatively low-lying terrain of Karmøy, the limited vegetation, and the non-existence of a partial windbreak such as the skjaergård, the wind blows strongly (average of 13 days a month when the wind is greater than 6 Beaufort) and is essentially from the south-southeast in winter and the northwest in summer.

Settlement

A comparison of the pattern of settlement with the geological and topographical features reveals a close correlation. The built-up areas are mainly on the strandflat which is also the location of the bulk of the cultivated and productive farmland. However, the settlement of Karmøy is dispersed except for the south-central part of the island. The built-up areas lie essentially along the main roads such as the Karmøybanen and along the coast. Thus, they are essentially seaside settlements. There are three main towns on the island: Kopervik, Åkrehamn, and Skudeneshavn. (Figure 4) The population is concentrated within these settlements as well as ten bygdebyer - unincorporated towns grown-up around an industry or especially, a railroad station. These towns have been built near industries connected with fishing such as cold-storage plants, herring-oil factories, and other fish-refining plants. According to Hallstein Myklebost (Table I), Kopervik is classified as a central

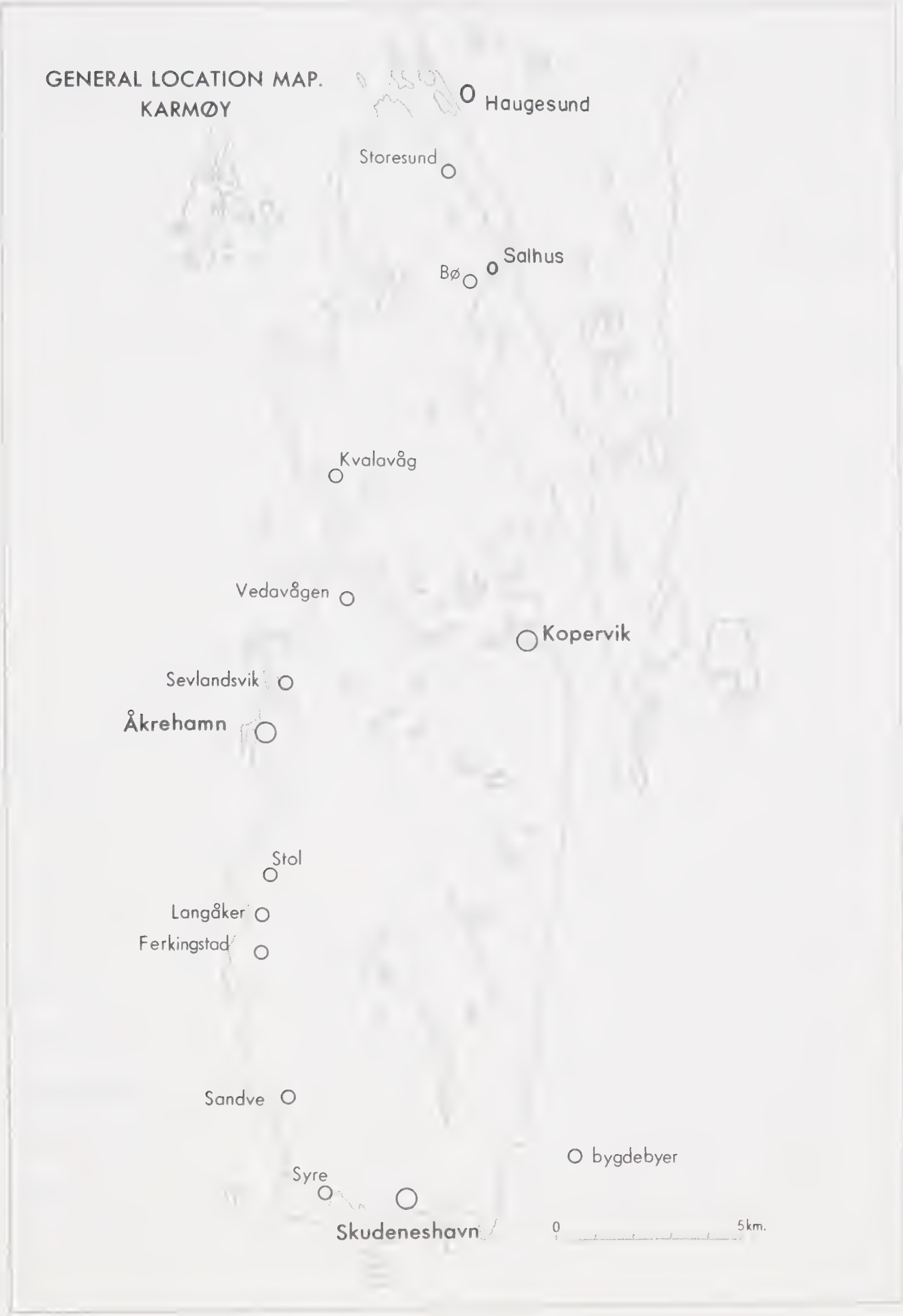

GENERAL LOCATION MAP.
KARMØY
Haugesund
Storesund
Salhus
Bø
Kvalavåg
Vedavågen
Kopervik
Sevlandsvik
Åkrehamn
Stol
Langåker
Ferkingstad
Sandve
bygdebyer
Syre
Skudeneshavn
0
5km.

Figure 4

settlement and has an economically active population akin to that of Haugesund. Åkrehamn, Vedavågen, and Sevlandsvik are all fishing settlements whereas Visnes accounts for the only industrial settlement on Karmøy and Skudeneshavn does not belong to any one specific class. In 1960, just under one-half of the total population (48 percent) had their place of residence within these towns and bygdebyer.

Between Sevlandsvik and Skudeneshavn, the houses and farms are built very close together and tend towards a type of contiguous urban belt. Almost one-third of the population of Karmøy live here in the southwest part of the island. This area has a large tract of arable land as well as the fishing port of Åkrehamn and associated fish-refining plants.

Table I - Functional Classification of Urban Settlements on Karmøy. Urban settlements classified according to the percent of the economically active population engaged in different industries.

Tettsted	Type	Farming	Fishing	Industry	Commerce	Communication	Domestic services	Other
Visnes	I	8.1	3.3	65.1	4.1	13.8	4.8	0.8
Kopervik	S	0.8	11.3	37.6	16.0	22.8	4.1	7.5
Åkrehamn	F	4.1	45.7	21.1	7.5	14.8	3.2	3.6
Vedavågen	F	3.7	55.2	12.5	7.9	12.7	5.0	3.0
Sevlandsvik	F	3.3	56.9	13.1	7.7	14.8	2.0	2.2
Skudeneshavn	A	1.4	15.5	34.5	11.2	22.8	6.6	8.0
Haugesund	S	1.5	1.9	37.4	19.9	22.8	5.8	10.7

Central settlement(S): commerce, etc. comprises at least 15% of the economically active population excluding farming, fishing, domestic services, and activities unknown or inadequately described. Manufacturing, construction, etc., fishing and whaling employ less than 60%. Manufacturing, construction, etc. alone employ less than 50%.

Other urban settlements(A): places which do not belong to any of the classes above.

Fishing settlement(F): at least 30% of the economically active population is engaged in fishing and whaling.

Industrial settlement(I): at least 50% of the economically active population is engaged in manufacturing, construction, etc. Demands under (S) are not met.

Source: Hallstein Myklebost, Norges Tettbygde Steder 1875-1950. Universitetsforlaget, Oslo-Bergen, 1960. p. 340.

An example of the scattered, linear type of settlement pattern is represented in Figure 5. This is what can be considered as a representative sample of the type of settlement pattern which predominates over the Karmøyan landscape. The sample is taken from an area between Åkrehamn and Skudeneshavn which is along the west coast of the island. The communal and private motor roads form a trellis arrangement from the Karmøybanen, being very short, connecting transportation links from the farm houses to the main thorough-fare. The individual properties are small in area, have irregular sizes and shapes, and do not form any specific pattern. To the immediate west of the diagram is the North Sea

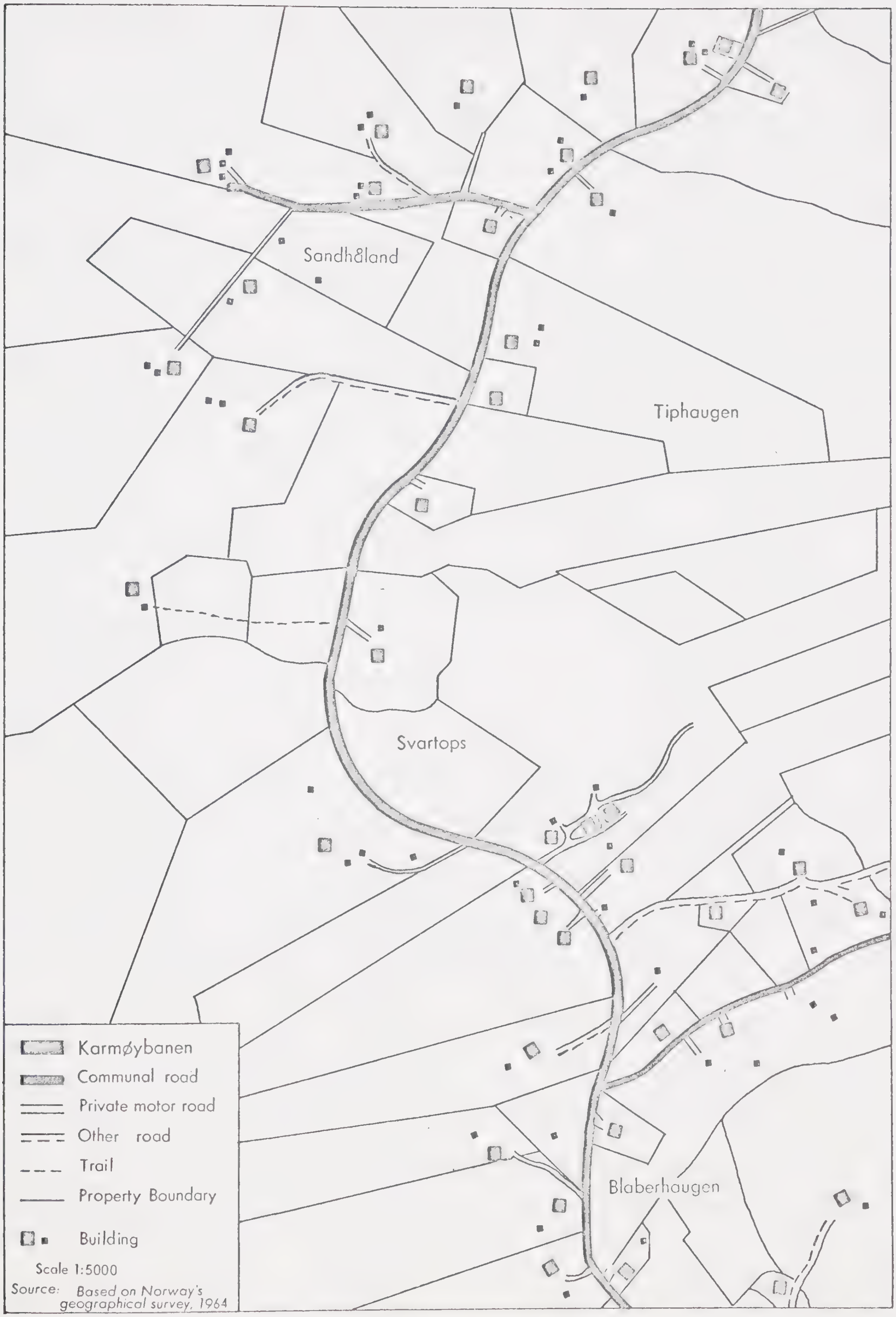

Sandhåland
Tiphaugen
Svartops
Blaberhaugen
Karmøybanen
Communal road
Private motor road
Other road
Trail
Property Boundary
Building
Scale 1:5000
Source: Based on Norway's geographical survey, 1964

Figure 5

and to the east lies the virtually uninhabited interior of the island consisting essentially of uncultivable heath.

Economy and Livelihood

The economy of Karmøy has been dominated by fishing and agriculture although another common occupation has been that of seaman. A comparison of the work force on Karmøy in 1960 to that for the country as a whole is represented in Table II. Compared to the Norwegian average, Karmøy had a much higher proportion of the population engaged in fishing (17.5 percent compared to 3.9 percent) and a much lower proportion engaged in industry (18.0 percent compared to 34.7 percent). The higher percentage in communication and transportation was due to the large number of seamen. The proportion of the work force in farming was approximately the same as the Norwegian average.

The main agricultural areas are found in those regions where the extent of the strandflat is greatest - in the southeast at Farnes and in the north throughout Avaldsnes and Torvastad. In 1959, there were 1,034 farms larger than 2.5 acres and 10,415 acres of cultivated land and pasture. The average farm is small, being only about 10 acres. The largest farm is only 74 acres and is located in Avaldsnes. Dairy farming predominates and other main agricultural products include potatoes, hay, and vegetables. The scattered nature of suitable agricultural land has encouraged dispersal of both fields and farms and the limited size of such areas has made for small fields. This has resulted in farming alone

Table II - Resident Population by Industry, 1960

	Karmøy (%)	Norway (%)
Farming	13.5	15.2
Fishing	17.5	3.9
Industry	18.0	34.7
Communication and Transportation	22.0	10.3
Commerce	9.0	10.3
Services	11.0	13.2
Other	9.0	12.4
	100.0	100.0

Sources: Andersson & Skjånes, *Karmøy Prinsippforslag til Generalplan*. Haslum, 1965. Tabell 3.

Norges Offisielle Statistikk, *Statistisk Årbok 1967*. Oslo, 1967. p. 14.

being an uneconomical enterprise and as a result, a combination of this occupation with fishing is common.

All year round, but especially in the winter months from January to March, herring and cod make their way to the inshore banks of the Norwegian coastal waters in search of food and spawning grounds. The greater part of the fishing is inshore and is carried out within the territorial limits, behind the shelter of the outer islands or skerries. Therefore, the bulk of the fish is caught with the aid of "passive" gear - principally nets, lines, and seines. This has favored the establishment of fishing towns and villages all along the coast, i.e. Åkrehamn, Sevlandsvik, and Vedavågen. The large proportion of the population of Karmøy devoted to fishing as a full-time livelihood has resulted in a fluctuating economy directly related to the total catch and the market price of fish. From 1956 through the early 1960s, catches had declined due to the diminishing stocks of herring and cod resulting in part from the small annual hatchings and over-fishing. Along with the failure of the traditional winter herring and cod season, there was a transition to larger fishing vessels and mechanization of agriculture. Thus, a surplus of labor developed which subsequently led to out-migration, especially amongst the younger generations. This resulted in the development within the Karmøy region of a strong desire for a more varied economy.

Administration

In 1960, the island of Karmøy was divided among seven different communes (municipalities). These communes are represented in Figure 6. The

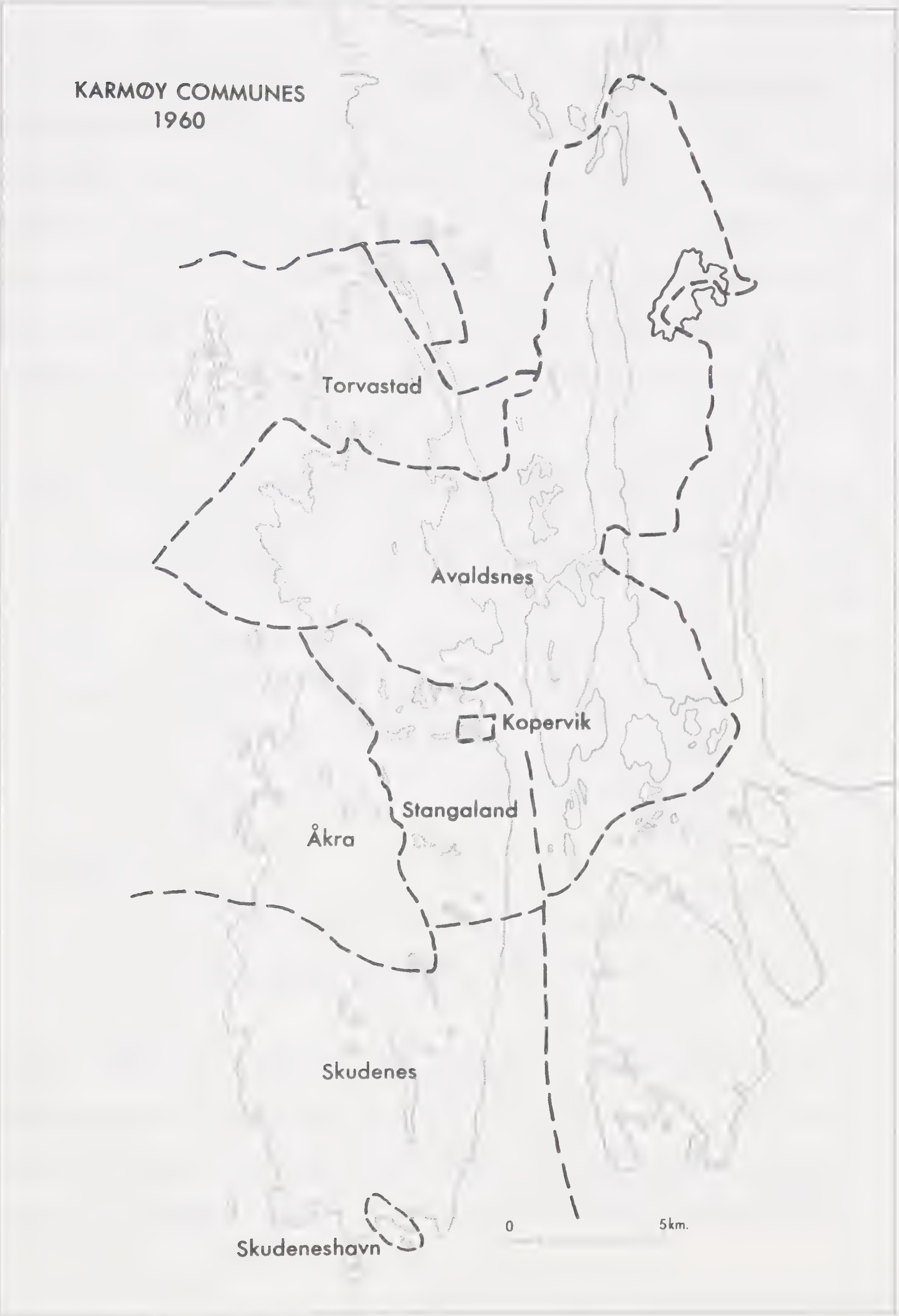

KARMØY COMMUNES
1960
Torvastad
Avaldsnes
Kopervik
Stangaland
Åkra
Skudenes
Skudeneshavn
0
5km.

Figure 6

two northernmost communes of Torvastad and Avaldsnes included parts of the mainland or Haugesund peninsula besides a section of Karmøy. The communes of Kopervik and Skudeneshavn were town communes and the southern half of the island, aside from these town communes, was divided into the communes of Åkra, Stangaland, and Skudenes. The area and population of each individual commune is given in Table III. In Rogaland, the average township or rural commune had a population of 3,099 and an area of 192

Table III - The Size and Population of Karmøy Communes, 1960

	Communes	Area (in sq. km.)	Population	Density
rural communes	Torvastad	25.9	3,146	121.5
	Avaldsnes	125.9	4,701	37.3
	Åkra	33.4	5,749	172.1
	Stangaland	28.5	2,420	85.0
	Skudenes	67.5	3,362	50.0
town communes	Kopervik	0.4	1,836	
	Skudeneshavn	0.5	1,383	

Source: Innstilling Storting nr. 177-1963-64. p. 371

sq. km. (density: 16 inhabitants per sq. km.). The population of the rural communes on Karmøy was slightly higher than the average for the county of Rogaland but their area, except for Avaldsnes, was far below the county average. Therefore, the average population density of 70

inhabitants per sq. km. was four times that of the average Rogaland township.

A further description of these communes and their individual administrations is given within Chapter III.

This information in Chapter I which ranges from a description of the size and location of the island of Karmøy, its settlement, economy and livelihood, through to its administration, is an attempt to present the general character of Karmøy as it existed about 1960. This, in effect, will be used as the basis for the discussion in the following chapters dealing with subsequent changes in Karmøy, since the initial construction and production of a large electro-industry on the island.

CHAPTER II

THE NORWEGIAN ALUMINUM INDUSTRY

Norway is the largest producer of crude aluminum in West Europe and one of the largest exporters in the world (after the United States and Canada). The annual production capacity is 535,000 tons; a figure constituting 7 percent of the aggregate world capacity and 28 percent of the capacity in West Europe.[1] Total output in 1969 is estimated at more than 500,000 tons with exports reaching a new peak of 480,000 tons. In other words, almost 96 percent is exported and aluminum alone accounts for 14 percent of the total value of exports from Norway.[2]

The first aluminum plant in Norway was established in 1905 (Vigeland Brug outside Kristiansand in southern Norway). By the mid 1920s there were five electrolysis plants for aluminum and the Norwegian share of world production was as high as 20 percent. This share has been reduced as a result of the tremendous construction and expansion of aluminum plants in Canada and the United States during and after the last war. Except for the construction of Mosjøen Aluminum A/S (MOSAL) in 1955, most of the recent expansion of the Norwegian aluminum industry has occurred since 1965. Sør-Norge Aluminum A/S at Husnes and Alnor Aluminum A/S on the island of Karmøy are new plants which are both partly based on foreign capital and were built in districts that had been devoid of newer, more modern industries.

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[1] Export Council of Norway Press Service, Norway the Biggest Producer of Aluminum in West Europe. Oslo, January 1970, p. 1.

[2] Loc. cit.

Direct foreign investment is supported by the Government when Norway, itself, is unable to raise capital for new industrial projects from national sources - the Government has thought it necessary to import one-half of the capital needed for aluminum projects.[3] As well as the increase in the number of plants, which now total nine, existing ones are being brought to higher capacity. Expansion plus construction of new plants in the next three to four years will increase the electrolytic capacity in the Norwegian aluminum industries to more than 700,000 tons annually.[4]

Within the world aluminum scene, the early 1950's were characterized by the need to catch up on demands for this product and 1969 ended a decade which saw a further growth and an upward swing in the aluminum industry.[5] On the whole, there is still a gap between capacity and demand; but, there are those who feel that there will be an inevitable over-capacity as opposed to others who envision that aluminum will find many more uses, and hence, over-capacity is out of the question. However periods of over-capacity will happen. This is explained by the fact that whereas demand usually shows a gradual growth, new production capacity has a tendency to come in waves.[6] This has been the case in Norway during the past five years.

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[3] Truls N. Treider, ed., Norway Exports 50 years of industrial progress. Export Council of Norway, Oslo, 1969, p. 62.

[4] Dr. Lenore Ernst and W. F. Wildschutz, "The Aluminum Industry at the Turn of the Year". Aluminium. Germany, 1970. p. 15.

[5] Ibid., p. 2.

[6] Ole S. Gilbo, "Aluminum on the Move". The Norseman. Reistad & Sønn, Oslo, 1966. p. 13.

Domestic consumption is only 26,000 tons annually or a per capita consumption of about seven kilos per year (per capita consumption of the United States and Canada is 15.2 kilos and 9.8 kilos respectively). Norway's consumption of aluminum will increase as the product becomes more important in, for example, the building industry, but this plays a minor role in relation to the total actual production or the total production potential. Therefore, Norway relies heavily on export. The competitiveness on the world market, including high tariffs and the prospects of over-capacity with a resultant reduced demand, can result in periods of instability which in turn affect the livelihood of the aluminum-based communities.

One of the greatest challenges that faces the aluminum industry both in Norway and other countries is to be found in the fields of research and development. Producers themselves must take an active part in finding new uses for the material.[7] Norway's competitive position may change in the next few years as the former advantage of cheap hydroelectric power is reduced. Future development of aluminum works will depend upon how competitive hydroelectricity will be in the long run, compared to energy supplied through nuclear power, oil, natural gas or coal. In the United States, coal and natural gas now account for about one-half of the energy used by the aluminum industry.[8] At present, the Norwegian hydroelectric

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[7] Ibid., p. 15.

[8] John F. Lounsbury, "Recent Developments in the Aluminum Industry in the United States". Readings in Economic Geography. John Wiley and Sons, Inc., New York, 1967. p. 270.

power is still the cheapest source of power. A local community of five to ten thousand people built-up around an aluminum plant might, in Norway, appear as a picture of prosperity, but it is extremely vulnerable to structural changes.

In the past decade, consumption of aluminum has continued to out-pace the rise in production. With an outlook towards a continuation of the increasing world demand, the ensuing decade from the aluminum industry's point of view is one of optimism.

Alnor Aluminum A/S

Alnor Aluminum A/S is located at Håvik on the island of Karmøy about 14 km. south of Haugesund. According to the Norsk Hydro officials, the major reasons which led to the choosing of this particular site were as follows:

(1) sufficient land available at an acceptable price.

(2) good expansion possibilities.

(3) sheltered, deep-water harbor facilities opening on to the North Sea.

(4) favorable topography and climate.

(5) available labor supply.

(6) local authorities showed positive interest.

Most important was the fact that Karmøy was already a well-developed community so it was unnecessary to build a new industrial town or make extensive changes in the traditional "milieu". The district was equipped with such facilities as schools, hospitals, housing, churches, roads, etc.

The relatively flat terrain combined with the resultant exposure to a great deal of wind minimized possible fume and gas release problems. The topography was also favorable with regard to the fact that Alnor could build its own ice-free, deep-water wharf, and no intermediate transport is involved. The short distance between the island and the mainland across Karmsund Passage gave relatively easy access to Norsk Hydro's own hydroelectric power.

The potential supply of cheap hydroelectric power is the prerequisite - and the reason - for the continued expansion of the Norwegian aluminum industry. This usually takes place in western Norway not only because of the excellent ice-free ports in the fjord country, but also because this part of the country has the largest untapped power resources. Another major reason for the transmission of power towards the west is the planning policy of the Norwegian authorities. This policy would not allow the power to be brought over to the eastern part of the country, i.e. the Oslo fjord environs, because this is the most densely populated and highly industrialized area of Norway. The authorities are concerned that all parts of the country should maintain a reasonable share of the population and industrial activity, and thus, their policy is one of decentralization.

The aluminum plants at Husnes and Karmøy are both supplied with electric power from the new installations at Røldal-Suldal which include five power stations which produce 2.2 billion kwh per year. The power to Alnor is transmitted via the switching station for the Norwegian grid in Sauda. It is carried on two parallel 300 kv. lines to the plant, 78

km. west. Compared to the cost of furnishing all the facilities for a new industrial town, the disadvantage of the extra cost of bringing power from the source to the plant site was of secondary importance. The Government did not indicate any preference for the Karmøy area or for any other particular site since most of western Norway within reasonable distance from Røldal-Suldal was underdeveloped industrially.[9]

Alnor is jointly owned by Norsk Hydro (51 percent) and Harvey Aluminum (49 percent). Norsk Hydro is the largest industrial undertaking in Norway whose international interests include hydroelectric power, nitrogen fertilizers and magnesium, as well as aluminum. Harvey Aluminum is one of the leading aluminum producers in the United States. Alnor was established on May 5, 1963 and construction began in June the following year. Harvey was responsible for the technical design of the plant and Norsk Hydro for all electrical installations. By August, 1967, the foundry was ready to receive metal. The aluminum plant itself covers 27.5 acres of the 138 acre site owned by Alnor and cost about 650 million kroner* (97.7 million dollars). It is an integrated plant producing not only raw aluminum but also processing raw aluminum to semi-fabricated goods such as sheet, shapes, strip, tubes, and wire rod. When Alnor started production, the raw aluminum processed to semi-finished or finished products in Norway increased from eight to fifteen percent.[10]

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[9] Pers. comm. Anders Ringnes, Norsk Hydro, Oslo.

[10] Ole S. Gilbo, "Aluminum Giants Join Forces". The Norseman. Reistad & Sønn, Oslo, 1967. p. 16.

* 6.65 kroner = one Canadian dollar.

The present capacity of production is 80,000 - 90,000 tons of raw aluminum per year. Relative to other Norwegian plants, Alnor is the second largest along with Mosjøen Aluminum A/S (90,000 tons), after the Government owned Årdal og Sunndal Verk (250,000 tons). Plans are being considered for an extention of the cell buildings by 25 percent which would increase production to 110,000 - 120,000 tons per year. Alumina is supplied from Harvey's alumina plant on the island of St. Croix in the Virgin Islands. The 340 meter-long quay along Karmsundet with an adjacent water depth of thirteen meters, can accommodate fully loaded vessels of up to fifty thousand tons.

One major disadvantage with respect to the location of Alnor was the unfamiliarity of the potential labor supply with large-scale industry. The problem arose of bringing in a nucleus of technical people from outside the district or training the local people. Alnor chose the latter and subsequently sent eighty men to the United States for training at Harvey's plants in California, Oregon, and Kentucky. Approximately 95 percent of the recruitment of the labor force was to come from the surrounding district. All employees have a forty-two and one-half hour week and there are three shifts daily. As of May 31, 1969, the labor force at Alnor numbered 878.[11]

Alnor's aim is to sell as much as possible of its production as semi-fabricated goods since the customer group is larger as opposed to that for raw aluminum. With the present customs barriers, EFTA is the

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[11] Employee Report. Alnor Aluminum A/S. May 31, 1969.

company's most important market with one-third being sold in Great Britain and another one-third in the other EFTA countries.

CHAPTER III

THE ADMINISTRATION OF KARMØY

In the first chapter, it was mentioned that the island of Karmøy was divided among seven separate communal units (Figure 6). Communes, or municipalities, are independent legal entities, but are subject to state supervision. The commune council has the right to levy a municipal income tax, a capital assets tax, and a property tax. It is responsible for the construction and maintenance of minor (local) roads, town planning, the supervision of buildings, fire precautions, sanitation, water supply, etc. The schools are the most important responsibility of the commune in the cultural sphere which also includes libraries, museums, and theatres.

By 1960, the Karmøy commune boundaries had already been under review by the Schei-committee.* In a preliminary proposal dated March 23, 1957, it was recommended that:

(1) Torvastad and Avaldsnes, except for the areas east of Førdesfjorden, combine into one commune.

(2) Skudeneshavn and Skudenes, except for the farm of Blikshavn and Snørteland, combine into one commune.

(3) Kopervik and Stangaland, with the addition of Blikshavn and Snørteland, combine into one commune.

(4) Åkra remain unchanged as one commune.

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* Shei-committee - a government-sponsored committee whose purpose was to make recommendations to the Norwegian Parliament regarding the redistribution of the commune boundaries in Norway so as to create more adequate and economically self-sufficient units.

The attitudes of the administrations of the above-named communes towards the recommendations were varied. The communes of Torvastad and Avaldsnes were both against amalgamation because they felt their current boundaries and population were of a size which warranted the maintenance of their own separate communal status. Both had what they termed, a "secure" economic base consisting of farming, fishing, and industry. In addition, there were many seamen who resided in the communes and this added substantially to the economy. Avaldsnes also felt that the area east of Førdesfjorden was tied economically and culturally to the west rather than to Tysvaer, "...historic traditions have binded the people in the commune together to work for the communes growth."[1]

The Skudeneshavn town administration also was firmly opposed to amalgamation because they could see no advantage from having a joint-livelihood or a joint-administration with Skudenes.

> "...the differences in standard between a rural commune with spread settlement over a large area, and a strongly concentrated settlement with ordered area development, ordered fire department, own waterworks and sewage system, own town school system, and a harbor which yearly requires a large amount of money to subsequent construction, will cause antagonism which will result in stagnation for the development of a well-arranged central business district."[2]

Skudeneshavn did, however, seek an expansion of its boundaries so as to add one sq. km. to its area. The Skudenes administration was unanimously opposed to the relinquishment of any of their area because they favored

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[1] Kommuneinndelingskomiteens Endelige Tilråding om Kommuneinndelingen I Rogaland. Stortings Biblioteket, Innst. 1962: 33, p. 36.

[2] Ibid., pp. 32-33.

amalgamation and thought it to be the best arrangement to a rational solution to several practical problems, i.e. commune building and construction. A common unit would bring about a more varied and solid income base.

Kopervik, like Skudeneshavn, found it necessary to try to retain its town status because it has special duties to perform like the building of the harbor which is used for merchandise and personal traffic for almost all of Karmøy - Kopervik is the only Karmøy commune off the coastal route of Karmsund Passage which is served by both local and foreign ships. There was also an acute lack of building lots within the confines of Kopervik's boundaries but Stangaland's position was exactly the same as that for Skudenes, "...when Kopervik has no expansion possibilities and has to reduce Stangaland, there seems to be no other question than full amalgamation."[3] Stangaland wanted to amalgamate with Kopervik for the same reason Skudenes wished to unite with Skudeneshavn.

The Schei-committee had considered forming one or two communes from all Karmøy but, because of the many strongly developed centres on the island, this was thought to be disadvantageous. Consequently, a new divisional setup had as its goal, the collection of areas into units which naturally grouped together, e.g. the transportation network trended towards the central points of Skudeneshavn, Åkrehamn, Kopervik, and a developing centre at Salhus. The divisional units would appear as represented in Figure 7.

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[3] Ibid., p. 36.

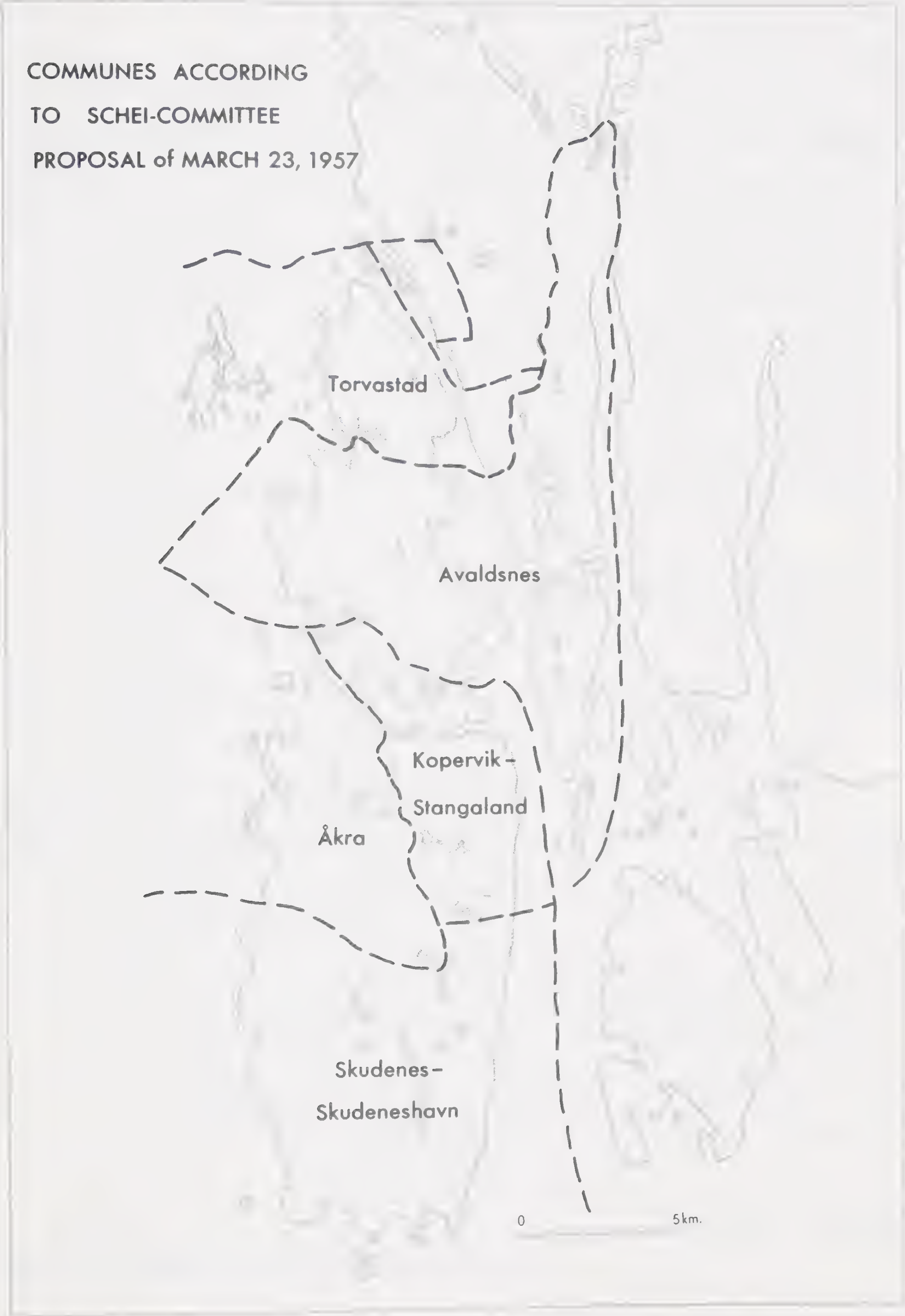
COMMUNES ACCORDING
TO SCHEI-COMMITTEE
PROPOSAL of MARCH 23, 1957
Torvastad
Avaldsnes
Kopervik-
Stangaland
Åkra
Skudenes-
Skudeneshavn
0
5km.

Figure 7

By May 24, 1963, the views of the commune administrations had changed considerably. Kopervik, Stangaland, Skudeneshavn, and Skudenes were now all in favor of complete amalgamation into one commune, with Åkra considering this a secondary choice behind its own complete independence. On the other hand, Torvastad and Avaldsnes were still against any sort of amalgamation. Torvastad felt it had little connection with southern Karmøy as its many ties were with Haugesund and it was more of a suburb of that city-commune, "...amalgamation with others would be unnatural, unfortunate, and would hinder the natural development within the district."[4]

The significant change in public opinion towards the shifting of the old commune boundaries was a result of the crystallization of Norsk Hydro's industrial plans at Håvik. As a direct result of this new development, the seven communes were combined into one large commune by the Storting, Norwegian Parliament, as of January 1, 1965 (Figure 8). The Kommunal og Arbeidsdepartmentet, Ministry of Municipal Affairs and Labor, gave the following reasons which recommended that such an action would prove advantageous for all communes concerned:

(1) income from taxes. Differential tax rates between neighboring administrative areas raised the question of changing their boundaries. All communes would, in this way, get their share of the tax which is assessed on the worker's

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[4] "Om revisjon av Kommuneinndelingen i Rogaland - Kommunene på Karmøy. Storting Proposisjon nr. 26 (1963-64). p. 9.

wages (employees would be scattered throughout the island). Merchants would also get a share of the increased turnover which would follow full employment.

(2) need for joint organization of communal planning development and administration, especially in the preliminary stages. The livelihood conditions had changed considerably and all communes had a reserve of manpower. The industry demanded wide-ranging planning and administration carried through under one administrative unit.

(3) irregular boundaries caused overlapping of community services and functions, e.g. supplying of electricity. If the boundaries had been retained, wide-ranging intercommunal cooperation would have been needed to solve the tasks of an economic change-over. Even if cooperation had been good, tasks would be solved quicker and more effectively in one commune, i.e. joint intercommunal waterworks, development of further educational facilities, etc.

(4) Håvik would become the central node of the island and this cut across local central formations. Old boundaries had to be erased because everyone on the island would be interested economically in the new concern. The industrial development would also knit the mainland of Fastlandet west of Førdesfjorden to Karmøy.

(5) previous objections of the committee against complete amal-

gamation had lost their basis.

> "The amalgamation of all seven communes is the best solution, especially since there is going to be a major industrial development on Karmøy. It will be a strong commune with a varied economic life and a reasonable area with the best qualifications to tackle the tasks which will arise in the future."[5]

The general conception of complete amalgamation was always met by apprehension. This resulted from the people living in small units since, in the past, they had perspective of what was taking place in their own locale. They lacked the ability to see the new commune as a unit and had difficulty understanding that there must be parallel decisions for all locales - there was neither an economic perspective nor a conception of evaluation.[6] Amalgamation is still partly theoretical in that the administration is not centered at one locale and there are people in the administration who still are primarily concerned about their own part of the island.[7]

When service districts overlap the normal units of civil administration, they cause a blurring in the provision of public utilities. A zone of "areal compromise" is created between the idea of no boundary and the restraint of a strong political line.[8] Therefore, as in the case of Karmøy, under the auspices of Norsk Hydro's industrial concern, groups of neighboring townships tend to merge in order to carry on more effectively some of their functions (the number of communes in Norway decreased from

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[5] Innstilling Storting nr. 177 - 1963-64. p. 376.

[6] Per. comm. Olav M. Wikre, Skudeneshavn.

[7] Per. comm. Olaus Rønli, Stavanger.

[8] Norman J. G. Pounds, Political Geography. McGraw-Hill, New York, 1963. p. 206.

750 to 460 between 1960 and 1966). A regional plan is advantageous because the availability of land in Norway for settlement is limited and competition for it between conflicting forms of land use is acute.

From the foregoing discussion, it has been pointed out that one of the first major effects of Norsk Hydro's industrial concern was a change in the boundaries of the communes on the island of Karmøy. The new firm with its expected dispersed work force cut-across patterns of livelihood and at least partly united the seven commune administrations by providing a common focus of projected increased economic benefits.

CHAPTER IV

THE ALNOR LABOR FORCE

The location of the current residences of the Alnor employees is shown in Figure 9. For the most part (about 77 percent), they are scattered throughout the commune of Karmøy. The major residence outside the commune is the city of Haugesund (21 percent). Thus, a total of 98 percent live within the communes of Karmøy and Haugesund combined. Taking the number employed in Alnor as 878, the percentage living in Karmøy commune as 77, and the average family size of 3.8, the number of people directly supported by this industry within Karmøy is 2,569 or close to 10 percent of the total population of 26,702 as of January 1, 1969. Thus, as opposed to aluminum and other electro-industries on the west coast of Norway, Alnor is not a "corner-stone" industry within its particular commune. It is, however, the industrial giant in that it employs about 60 percent of the total industrial work force on Karmøy.[1]

The work force commutes to Alnor by bus or car from as far away as Våge in the commune of Sveio (45 km.), Førdesfjorden in the commune of Tysvaer (27 km.), and Skudeneshavn on the southern tip of Karmøy (30 km.). Thus, the commuter field is bordered by Våge, Sveio in the north, Førdesfjorden in the east, Skudeneshavn in the south, as well as the western shoreline of the island. This is an area of approximately 260 sq. km. The population within this region is about 60,000.

The distance that employees are willing to live away from the industrial plant and commute to work daily is important when considering

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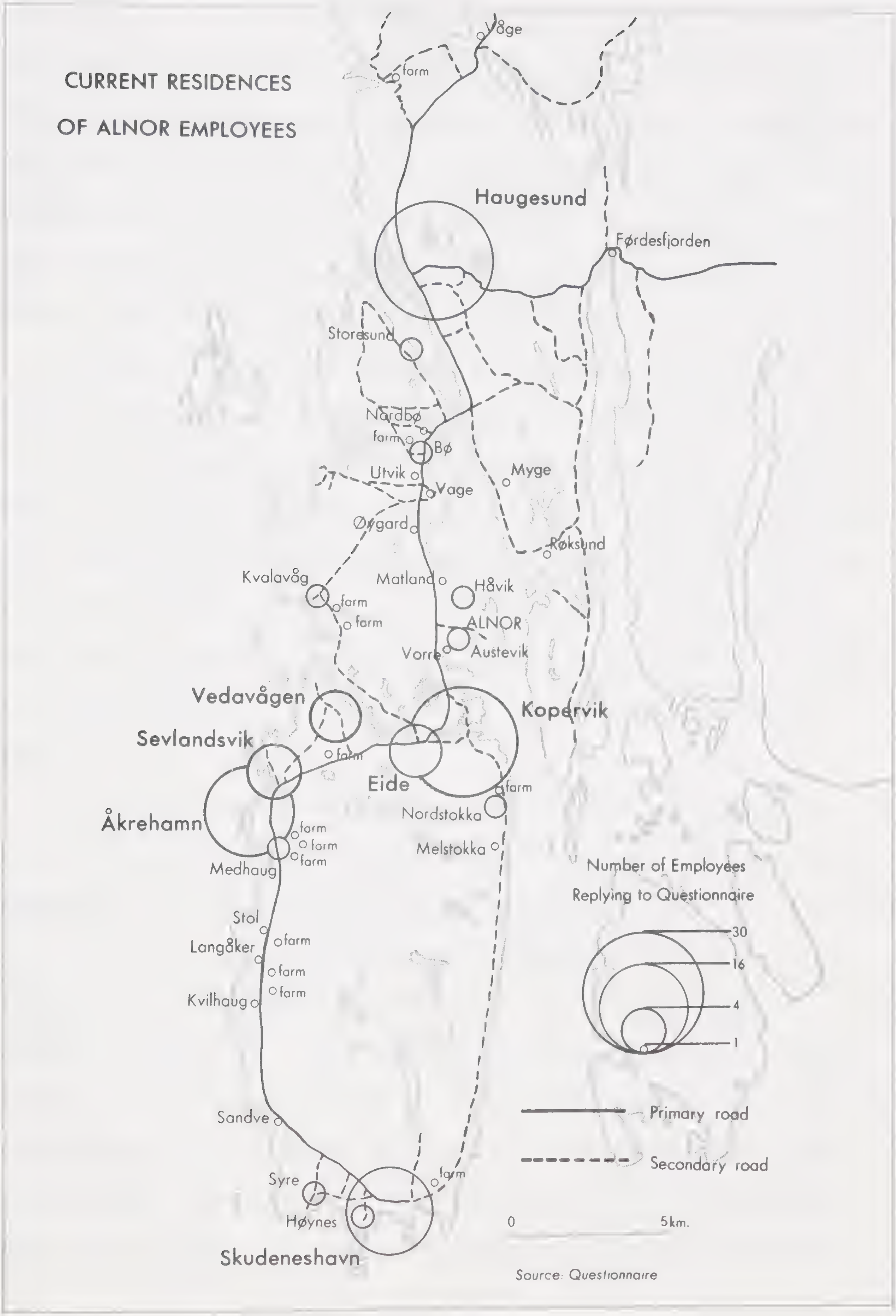
[1] Statistiske Opplysninger fra Karmøy-Bokn distriktet.



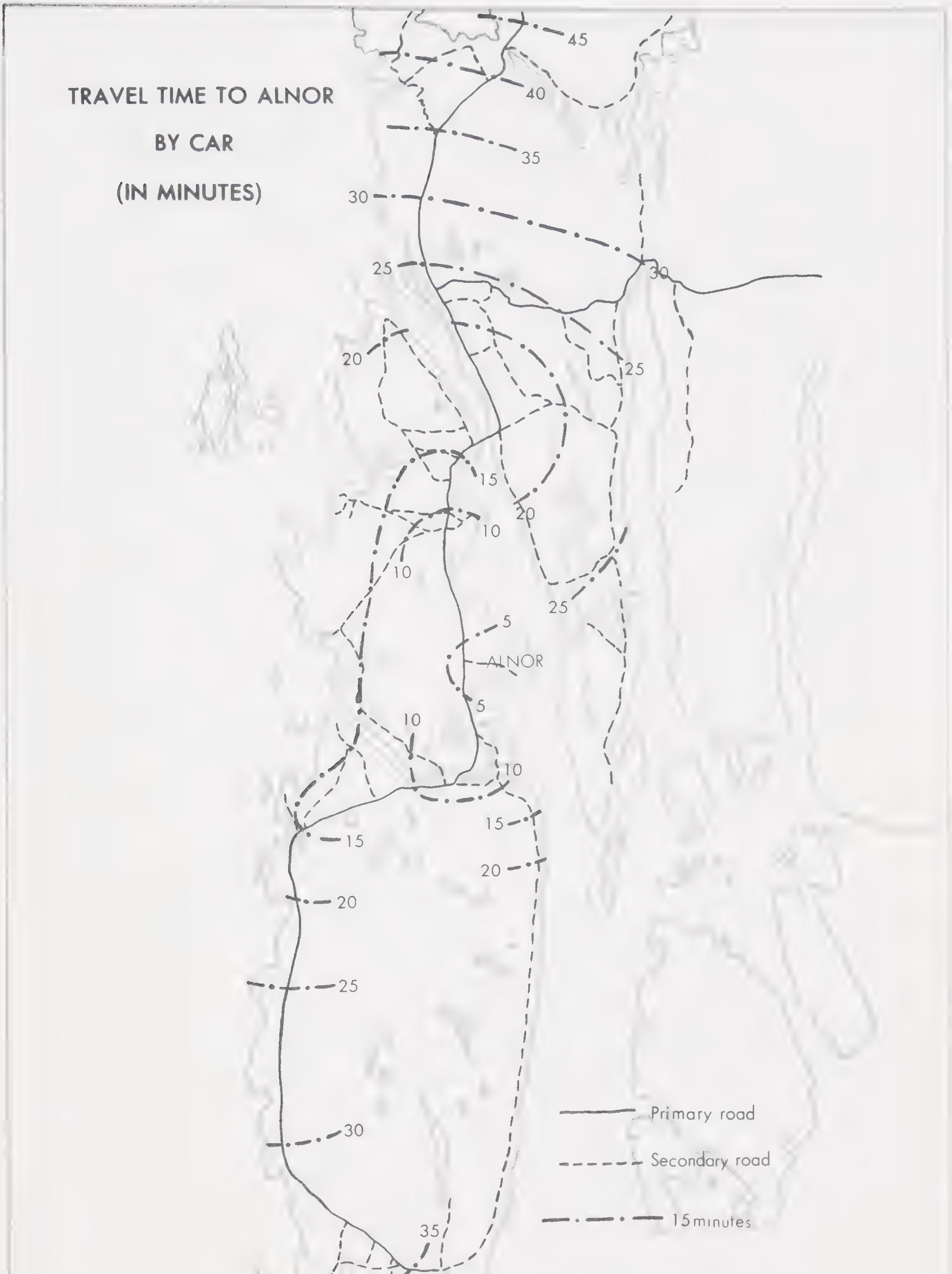
Source: Questionnaire

Figure 9

the growth centre policy of Norwegian authorities. Would it be more advantageous in regions suffering depopulation to develop a centre which may provide an alternative to migration whereby the people move to this centre within the region rather than outside it; or, by means of local and regional concentration, would it be possible to maintain the broad regional population distribution virtually unchanged?

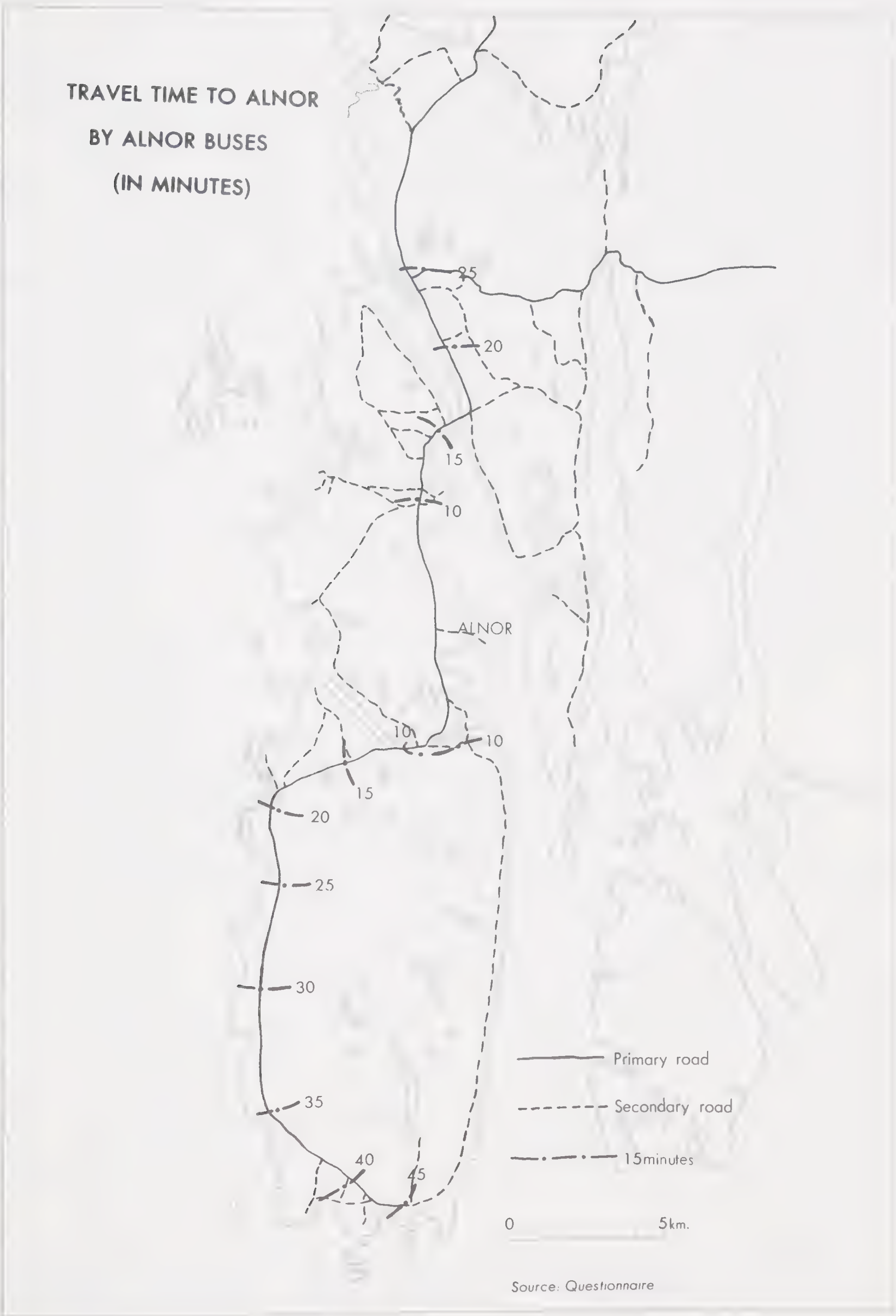
The majority of the employees in the commune of Karmøy live in the larger settlements such as Kopervik(14.7 percent), Åkrehamn (10.5 percent), and Skudeneshavn (9.8 percent). This is 35 percent of the total work force in Alnor or about 45 percent of those employees living within the commune of Karmøy. As has been pointed out earlier, there has been no distinct building of an associated industrial town near Alnor. In fact, only 5 percent of the work force live within 5 km. of the plant and the nearest large concentration lives in Kopervik about 6 km. to the south.

The average distance of employee residences from Alnor is 14 km. This is in striking contrast to the norm of industrial activity in *Vestlandet* where the industrial town is essentially adjacent to the industrial concern. Due to the already existing road network, the only extension required was to connect the aluminum plant with the *Karmøybanen* - a distance of just 2 km. Travel time to Alnor by car and by bus is superimposed on the main road network of the region in Figure 10 and Figure 11 respectively. The road along the east coast of southern Karmøy is not marked because this area has little settlement, there are no employees living here, and the road is in poor condition. Travel is essentially



Source: Questionnaire

Figure 10



TRAVEL TIME TO ALNOR BY ALNOR BUSES (IN MINUTES)

Source: Questionnaire

Figure 11

along the west coast.

The average distance of those travelling to Alnor by car is 12.7 km. or a travelling time around 17 minutes. In the extreme case, employees are willing to travel up to 50 minutes (Våge, Sveio) to reach Alnor. However, it must be kept in mind that although commuting ranges in rural areas are sometimes phenominal in a new plant's early years of operation, in time, some employees may move to closer locations while others quit because of excessive commuting costs.[2] The average distance of those travelling by bus is 19.4 km. or about 30 minutes travelling time. Alnor provides its own busing service each shift to Haugesund, Kopervik-Åkrehamn and Skudeneshavn. The cost is the same no matter what distance one lives from Alnor (approximately 60 kr. a month or nine dollars). The farthest terminal is Skudeneshavn which takes about 45 minutes. Haugesund is about 25 minutes by bus.

An interesting division of the proportion travelling by car and by bus from the different towns is evident in Figure 12. From Bø in the north to Sevlandsvik in the southwest, travel to work is almost exclusively by car. South of Stol, travel to work is almost totally by bus. Intermediate zones of more diversified travel between these two means of transportation occur from Bø through to Haugesund and from Sevlandsvik to Stol. Employees within 15 minutes travelling time by car travel by car, while employees over 25 minutes travelling time by car travel by bus. The reason for this probably lies in the fact that the Alnor buses are

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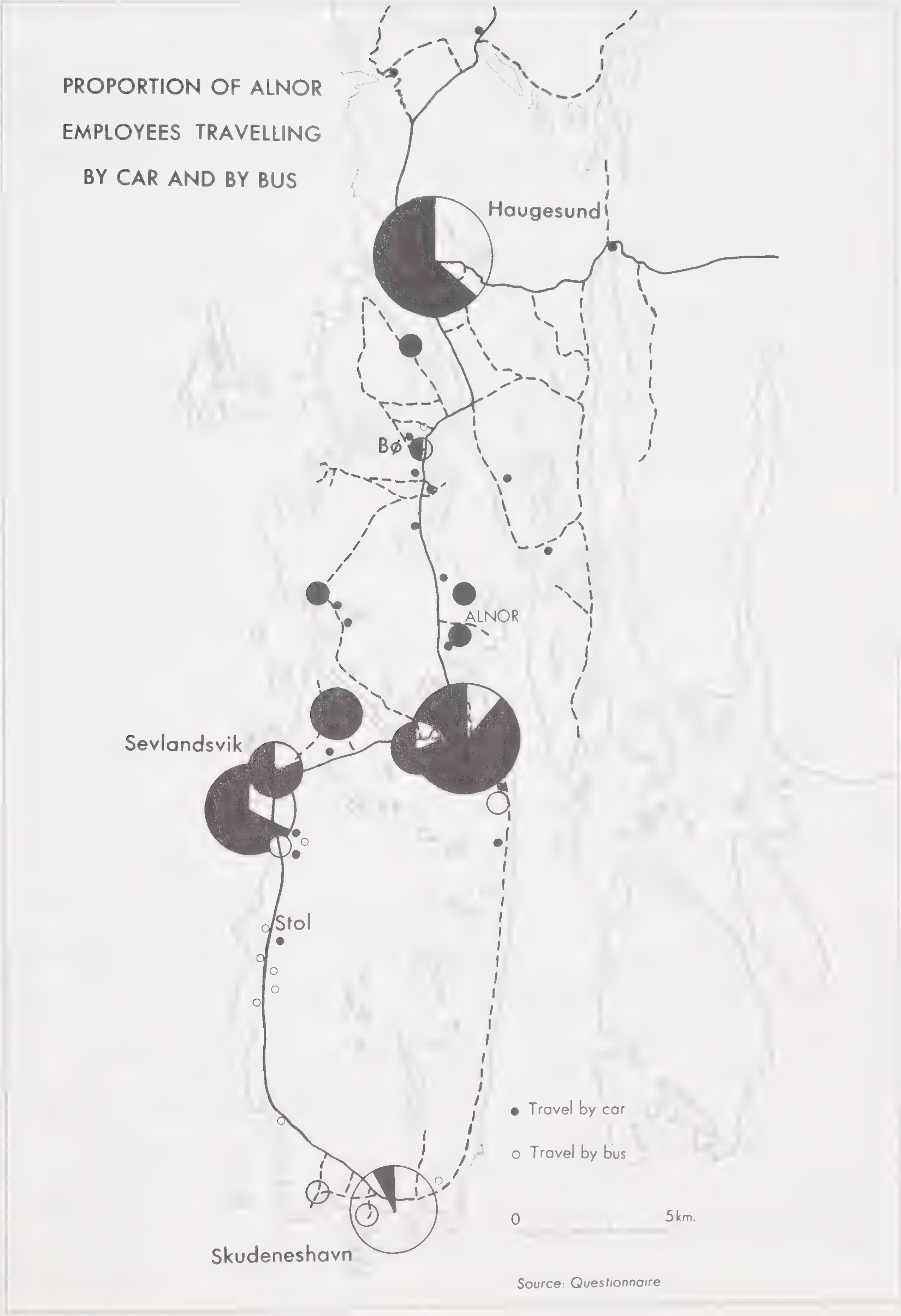
[2] Alan J. Hahn, "Planning in Rural Areas". Journal of the American Institute of Planners. Port City Press, Baltimore, January 1970, p. 47.



Source: Questionnaire

Figure 12

more direct than ordinary bus transportation and take only up to 10 minutes longer than car transport to reach Alnor (by ordinary bus transportation it takes 40 minutes to travel from Kvalavåg to Alnor as compared to 20 minutes by car). Due to the uniform cost of bus transportation, it is less expensive with distance when compared to the cost of commuting longer distances by car in a society where the price of gasoline is expensive (about 75¢ a gallon). Only a small minority travel to work using other means such as motorcycle or bicycle and a few living very close to the plant walk to work. The ratio of those using private cars to those using company buses is 1.7 to 1.

Table IV gives an account of the nature of the previous employment of the Alnor work force alongside the nature of the work force for all of Karmøy in 1960. With regard to Alnor employees, 26 percent or one-quarter had previous experience working in some type of industry. However, only 4 percent had any experience working in a large electro-industry and 2 percent were previously employed with another aluminum industrial concern. A comparison of the two sets of statistics will indicate which livelihoods contributed the largest number proportionately to Alnor and from which livelihoods the mobility of labor is greatest. It can be noted that the greatest diversities occur between the first four livelihoods as listed in the table. The biggest increase, or the largest number proportionately came from those who were previously employed in sea transport and industry. The smallest number were occupied in farming and fishing. The large number of former seamen was due to the fact that Alnor presented an opportunity to have a job on land close to their homes. This gave them a

Table IV - Previous Employment of the Alnor Employees

	Alnor employees		Karmøy Work Force, 1960	
Livelihood	number replying to questionnaire	%	number of persons	%
Farming	5	4	1127	13.5
Fishing	10	7	1461	17.5
Sea transport	44	31	1664	20.0
Industry	37	26	1465	18.0
Other communication and transportation	6	4	209	2.0
Building & Construction	11	8	720	9.0
Services	16	11	904	11.0
Other	13	9	727	9.0
TOTAL	142	100	8277	100.0

Sources: Questionnaire

Andersson & Sjånes, Karmøy Prinsippforslag til Generalplan, Haslum, 1965. Tabell 3.

chance to be with their families and live a normal family life. The increase in the number previously employed in industry is rather obvious considering the nature of the work.

Figure 12b shows the large number of young and middle-age people who have applied to work at Alnor and who are currently employed in Alnor. About two-thirds of the employees in Alnor are under forty years of age.

To a certain degree, Alnor has resulted in difficulty for other branches of industry in the commune. Many fishing crews are now having problems trying to get a sufficient number of young people to work on their boats.[3] The building industry had difficulty obtaining a sufficient number of laborers when the construction of the plant was in full force (1967). The farming industry has had a shortage of labor for many years so the coming of Alnor has not helped the situation.[4] However, many farmers with small acreages have been able to work with Alnor and manage their farms on the side. Previously, such part-time farming had been combined with the herring industry but Alnor has largely replaced the herring industry for part-time workers. The small proportion of fishermen having gone over to the industry is due to the twelve herring factories and three cold-storage plants on Karmøy which can employ the fisherman in the off-season.

With the optimism that resulted from the knowledge that a large, power-intensive industry would be built on Karmøy, many people felt this was the answer to solving the surplus reserve of labor and reducing the

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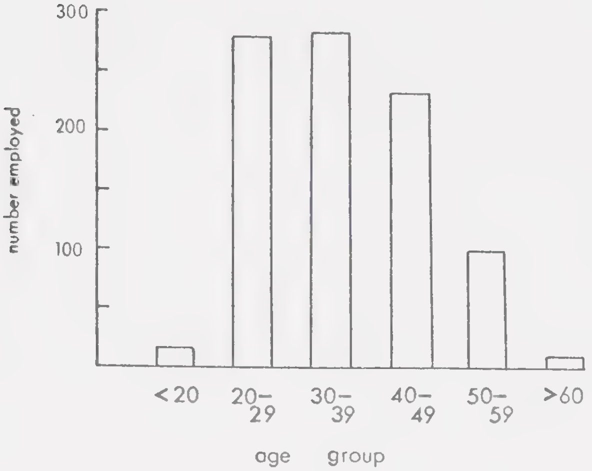
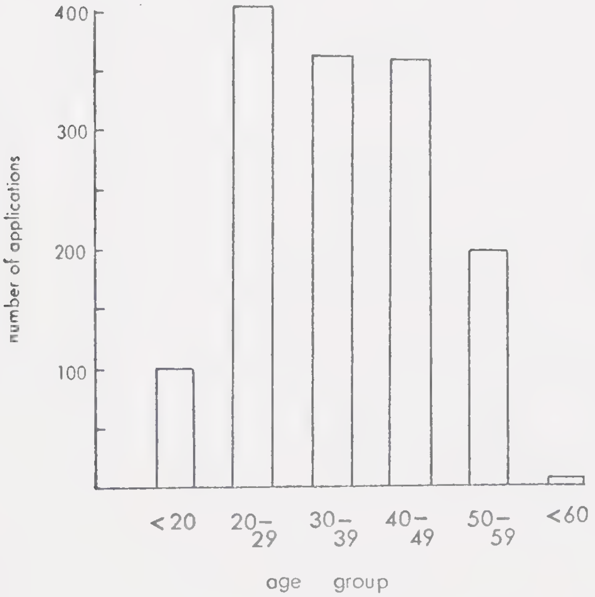
[3] Haugesunds Avis, October 11, 1967.

[4] Loc. cit.

Number Employed at Alnor by Age Group



Number of Applications to Alnor Through the Employment Agency as of June 10, 1967.



Source: Arbeidskontoret, Kopervik.

Figure 12 b

out-migration. To what degree this attitude was a realistic one is answerable upon examining the changes in employment in Karmøy since 1960. This is represented in Figure 13. The seasonal fluctuation is due to the seasonal activities of farming and fishing of the Karmøy inhabitants as well as the tallying of two for one job which occurs during the summer when additional workers are required to replace the regular employees on holiday. Up to and including the winter season 1962/1963, unemployment was close to, or considerably higher, than 400. A peak unemployment of 605 was reached in January, 1963. During this same time span, there were only three months in the year (June to August) when unemployment was less than 100 out of a total work force of about 8300.

The decrease in unemployment from January to April in 1963 was a result of the start of an extensive building program as well as the large activity on the sea which employed much of the work force reserve.[5] There was an associated expansion of cold-storage plants, herring-oil factories, etc. After the summer of 1963, the peak winter unemployment rate was reduced to approximately 300 with the lowest total being 163 in December, 1966. Unemployment at this time was minimized due to the construction of Alnor, an increase in the building of housing facilities, and increased employment in the fishing section both on sea and land. In 1966 about one thousand workers changed both work and work place, i.e. fishermen, seamen, small-farm operators, and the unskilled workers who became employed in industry, building, or construction. In the summer of

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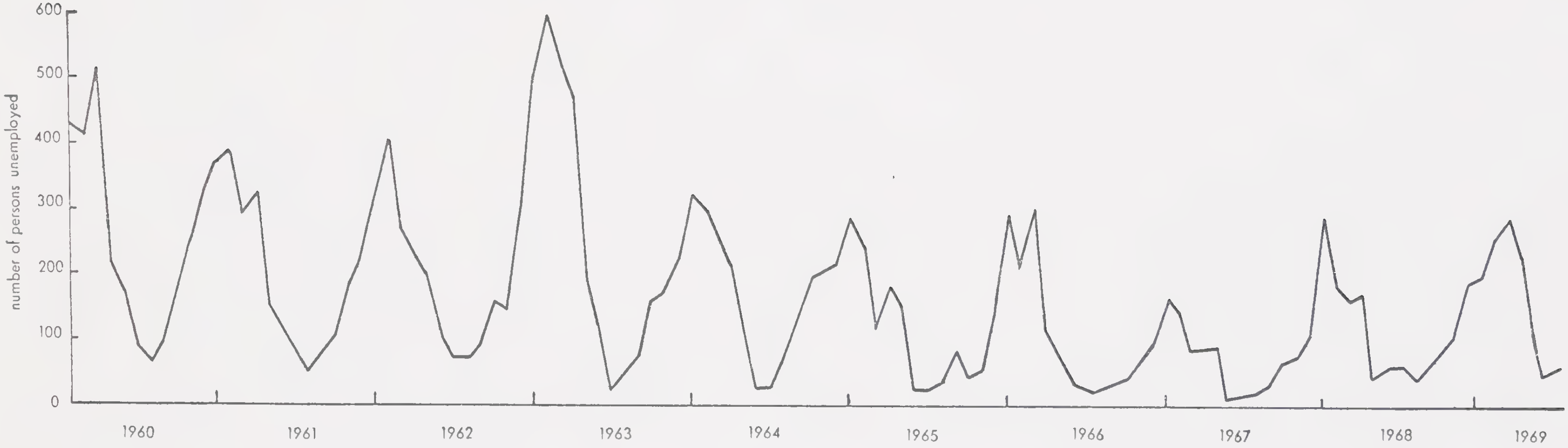
[5] Arbeidskontoret for Karmøy og Bokn. Årsmelding for 1963.

Unemployment on Karmøy, 1960-1969



Source: Det Kongelige Kommunal-og Arbeidsdepartement, Oslo.

Figure 13

1967 employment with regards to work at Alnor reached its peak (1700) with two-thirds of this total consisting of workers from the immediate district. The number of months per year in which unemployment was less than 100 had increased from six in 1965 to nine in 1967.

This expansion has, however, subsequently declined with the completion of the construction of Alnor. The number engaged in building and construction decreased by 414 in Karmøy in 1968 as workers from outside the area went back to their residences and the number of months in which unemployment was less than 100 decreased to six. It is significant that the number of unemployed have increased after having decreased to a minimum during the peak of activity in 1967. It cannot be said that unemployment does not exist after the coming of Alnor, but possibilities for employment were, at least temporarily, much better.

The main advantage of working in Alnor as stated by the employees is the increase in wages followed by the security of year-round work. Improved working conditions resulting in a more satisfactory working environment, and the fact that the work was of a more interesting nature were also cited numerous times. The poor income from farming and the unstable fishing industry were incentives to finding new or subsidiary employment.

Few people have had to change the location of their residences due to the fact that only a small number of employees come from outside the district and those already living within the commune can continue to live in their homes and commute to work daily. There was a change in residence in only 30 percent of the cases with the largest number coming from out-

side the district and having previously been employed in industry. They came from numerous locales distributed throughout the country (Figure 14). Movement into or near the commune of Karmøy was dispersed with no one town receiving the greater part of this in-migration. The employees who came from abroad (3 percent) were from the United States and Great Britain. Those from the United States were Norwegians who originally came from the Karmøy district and employment in Alnor provided an opportunity to return home. Of those changing residences within the district, only two specified that they moved because they wanted to live closer to Alnor.

In summary, since the coming of Alnor to the commune of Karmøy, there has been no building of a new industrial town because the majority of the employees already lived within the immediate district. The employees could continue to live where they had before and this was reflected in a dispersed work force. Alnor is a key industry but it is certainly not the only major livelihood for the district. One immediate effect of the industry was a decrease in unemployment but this state was only transitory. The recruitment of workers from other types of livelihood suggests a high mobility of labor and a willingness of the population to change jobs, especially with regards to seamen who have the opportunity to work on land and live at home. The dispersal of the work force suggests that it is possible to maintain the broad regional population distribution but one has to also consider that road transportation is much better than in other parts of western Norway, chiefly because the topography is not a major deterrent to the building and maintenance of roads.

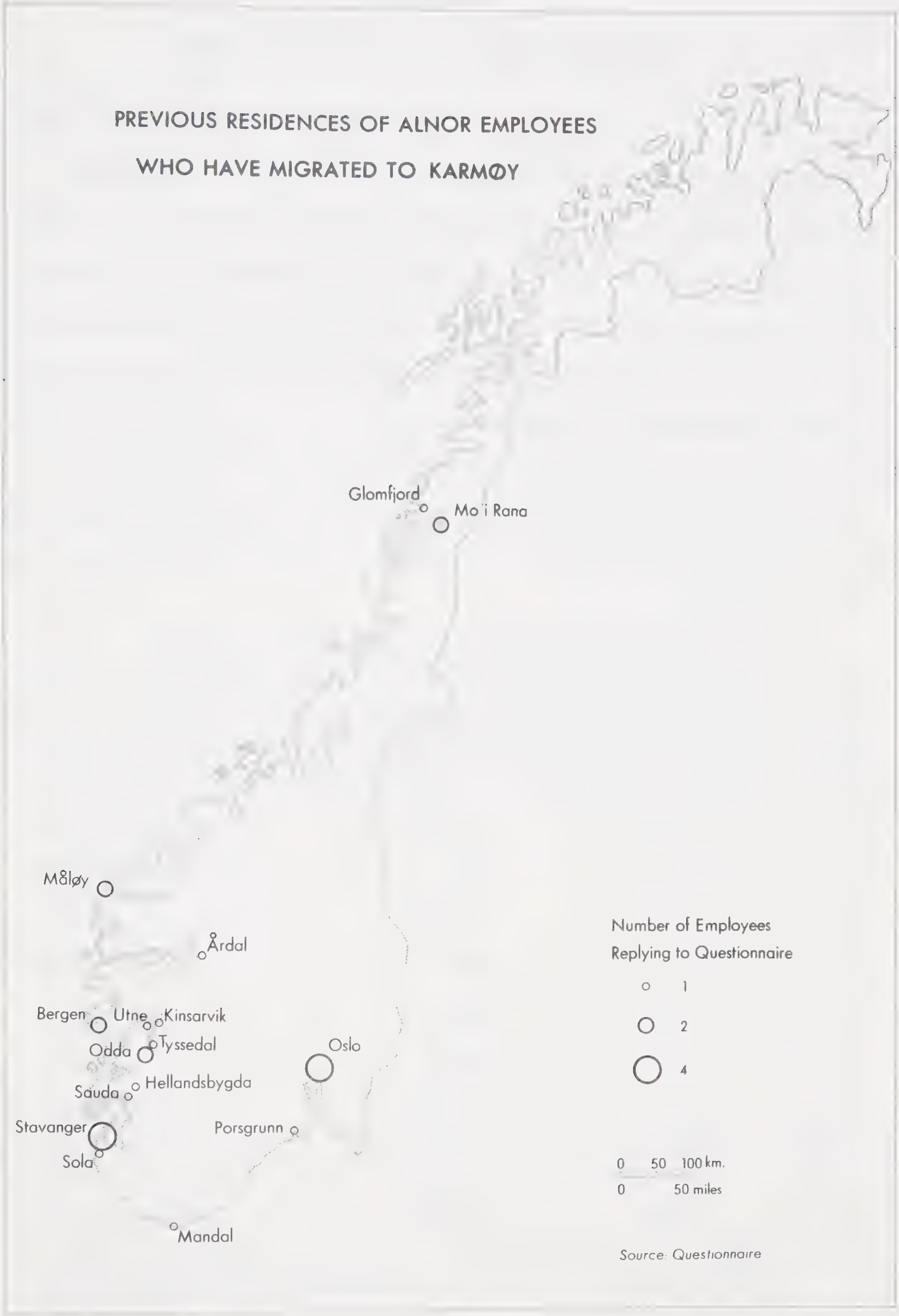

PREVIOUS RESIDENCES OF ALNOR EMPLOYEES
WHO HAVE MIGRATED TO KARMØY
Glomfjord
Mo i Rana
Måløy
Årdal
Bergen
Utne
Kinsarvik
Tyssedal
Odda
Oslo
Hellandsbygda
Sauda
Stavanger
Porsgrunn
Sola
Mandal
Number of Employees
Replying to Questionnaire
1
2
4
0 50 100 km.
0 50 miles
Source: Questionnaire

Figure 14

CHAPTER V

IMPACT OF ALNOR ON THE COMMUNE OF KARMØY

Impact on population and migration

It was expected that the introduction of a large power-intensive industry subsequently meant a significant increase in the population as a result of an increase of in-migration and decrease of out-migration. The population of the commune of Karmøy has increased considerably during the time span from the beginning of the construction of Alnor to its completion and subsequent production of aluminum. Between 1960 and 1968, the population increased from 21,569 to 25,847 - approximately 20 percent. The growth of Rogaland county and the composite individual communes of Nord-Rogaland is represented in Table V. Noteworthy is the fact that the

Table V - Population Growth of the Communes in North Rogaland, 1960 - 1968

North Rogaland Communes	Population November 1, 1960	 January 1, 1968	% change
Ryfylke	26,217	26,111	-0.4
Utsira	399	348	-12.8
Karmøy	21,569	25,847	+19.8
Bokn	822	745	-9.4
Haugesund	27,086	27,294	+0.8
Tysvaer	5,368	5,343	-0.5
Vindafjord	4,412	4,494	+1.8
Rogaland	238,662	259,969	+9.0
North Rogaland	59,656	64,071	+7.4

Source: Saertrykk. Sak nr. 65, Økonomisk oversikt for Rogaland fylke 1968. Fylkesmannen i Rogaland, Utbyggingsavdelingen. p. 501.

greatest percentage increase in population within North Rogaland is the commune of Karmøy and that four of the seven communes have decreased in population. The remaining two communes have only slightly increased and thus, of the total increase in population of 4,415 in North Rogaland from November 1, 1960 to January 1, 1968, 4,278 or 97 percent is located in Karmøy. The percentage increase in population in Karmøy (+19.8 percent) is also well above that for Rogaland as a whole (+9.0 percent).

As mentioned previously, Karmøy consisted of seven individual communes before 1965. The increase in population within these formerly separate areas of jurisdiction from January 1, 1960, to January 1, 1969,is represented in Table VI. The percentage increase was highest in Stangaland and Torvastad which were the northernmost communes on Karmøy.

Table VI - Population Growth of the Communes on Karmøy, 1960 - 1969

Karmøy Communes	no. of inhabitants		
(before January 1, 1965)	January 1, 1960	January 1, 1969	% change
Åkra	5610	6800	+21.2
Skudenes	3407	3800	+11.5
Skudeneshavn	1351	1250	-7.5
Kopervik	1835	1650	-10.1
Stangaland	2446	3500	+43.1
Avaldsnes	3830	5000	+30.5
Torvastad	3189	4700	+47.4

Source: Karmøy Likningskontor og Folkeregister, Rådhuset, Åkrehamn

Avaldsnes, Åkra, and Skudenes also increased in population but the population of the town-communes of Kopervik and Skudeneshavn diminished. The decrease or out-migration from these two towns is modified by the fact that they have expanded beyond the old commune boundaries. Although a decrease in population has occured within the former commune boundaries, the "geographic" towns have continued to grow in the immediate vicinity into the former communes of Stangaland and Skudenes respectively. In actuality, the growth for Stangaland and Skudenes as represented in Table VI is to a large degree a result of the urban expansion surrounding Kopervik and Skudeneshavn. Thus, the population has increased throughout the commune of Karmøy and is not confined to one individual locale.

The rapid increase in population in Karmøy was due to the in-migration for the construction of Alnor, the in-migration for employment in Alnor, and the high birth rate which is 24 per 1000 inhabitants against 18 per 1000 inhabitants for Norway as a whole.[1] Of the total population increase from 1960 to 1968, natural increase accounted for 60 percent of the growth while in-migration was responsible for the remaining 40 percent.

The degree to which Alnor was influential in this respect is apparent upon examining Figure 15. There is a distinct correlation between the graph and the time of the planning, construction, and completion of the aluminum plant. Before plans were made for such an industrial undertaking, there was an out-migration from the commune (1960). This changed

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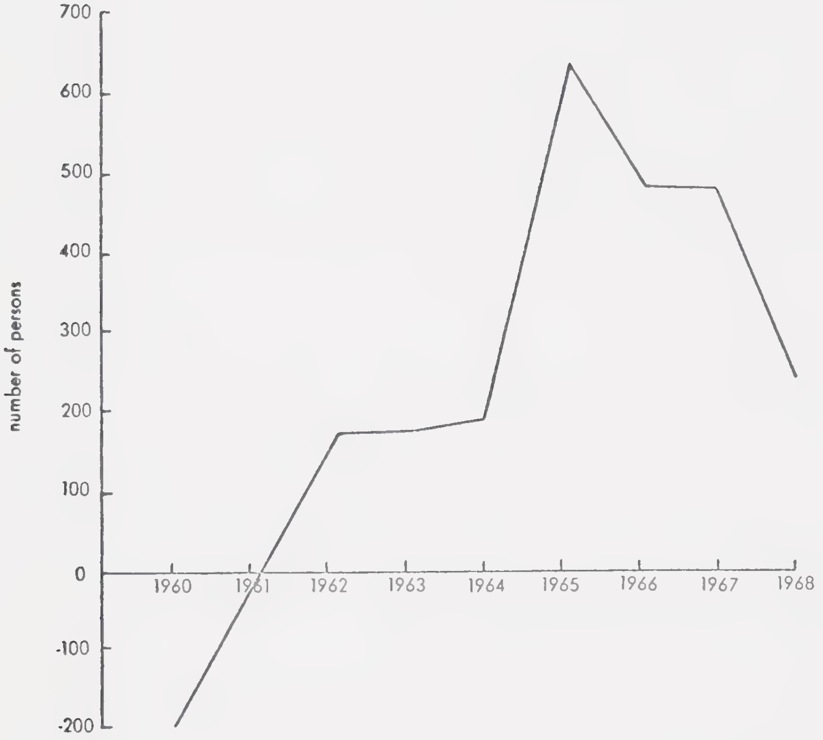
[1] Pers. comm. Arne Gunnerud, Teknisk Etat, Torvastad, Karmøy.

Net- Migration in the Commune of Karmøy, 1960-1968



Sources: G. Frøiland, Karmøy Assessment Office, September 2, 1969.

Norges Offisielle Statistikk A 30, Folkemengden i Herreder og Byer
Statistisk Sentralbyrå, Oslo

Figure 15

to in-migration when plans were made and finalized for the development of the industry (1962-1964). During the period of construction (1965-1967), net-migration reached its peak (+637) and remained close to +500 per year. After the completion of the construction of Alnor in 1967 and the starting of the actual production of aluminum, in-migration decreased since the labor force for the industry was in residence and prospects for employment in the commune lessened. In-migration for employment in Alnor represented approximately one-third of the total in-migration to the commune but only one-eighth of the total population increase.

Impact on settlement

The scattered settlement pattern on Karmøy is a result of the lack of any real planning measures or procedures in the past. This pattern is sustained by the politicians and many of the inhabitants since they prefer this type of arrangement to a more concentrated urban environment because of tradition, ties to their birthplace, and a widespread feeling of individualism. This viewpoint is partly due to the persistance of the concept of seven communes in the minds of the people and the competition between the former communes in trying to build-up their community facilities or service centre and increase the size of their population.[2] This was another main reason why an industrial town did not come into existence near Alnor. It was generally agreed from the beginning that the new housing districts would be distributed over the whole commune -

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[2] Loc. cit.

there would be a greater spreading of the building activity than the Generalplan presupposed. The Generalplan in question was a proposed plan drawn up by Andersson and Skjånes, a private planning firm employed by the commune of Karmøy in 1965. The commune officials felt that a plan was necessary to deal with the expected increase of population with the coming of Alnor and to coordinate and establish a development program for the seven former jurisdictional areas. The prognosis of the plan was based on the assumption that 650 would become employed in the concern.[3] Essentially, the plan contained sound basic planning procedures but it was rejected by the commune officials because they did not want the population growth to be concentrated in a few major districts. The proposal called for an extention of the already built-up areas with the northern half of the island being left for agricultural purposes (Figure 16). The plan also envisioned the establishment of Kopervik as the administrative and central node for the commune but this met with strong opposition from the inhabitants and officials living in Åkrehamn.

Due to the dispersal of the population growth as well as of those who migrated to the commune, the scattered settlement pattern remained. It conformed, more or less, with the already existent settlement pattern as discussed in Chapter I. This is apparent from the following series of nine maps showing the location of the building sites for single-family dwellings (Figures 17a to 17i). The information was obtained from the building applications which were submitted to, and approved by, the Kar-

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[3] Per. comm. Mr. Bonesmo, Andersson and Skjånes, Sandvika.

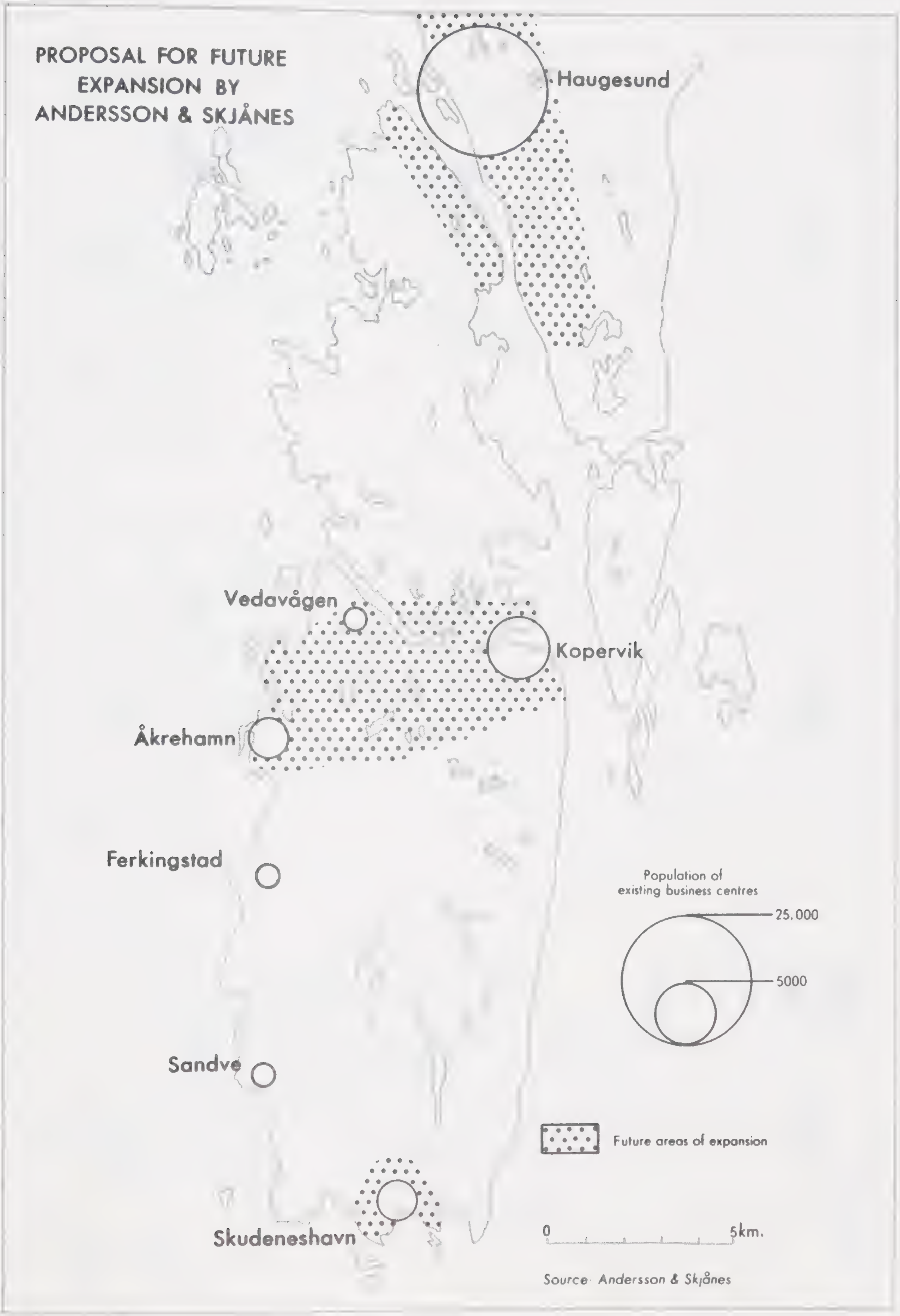
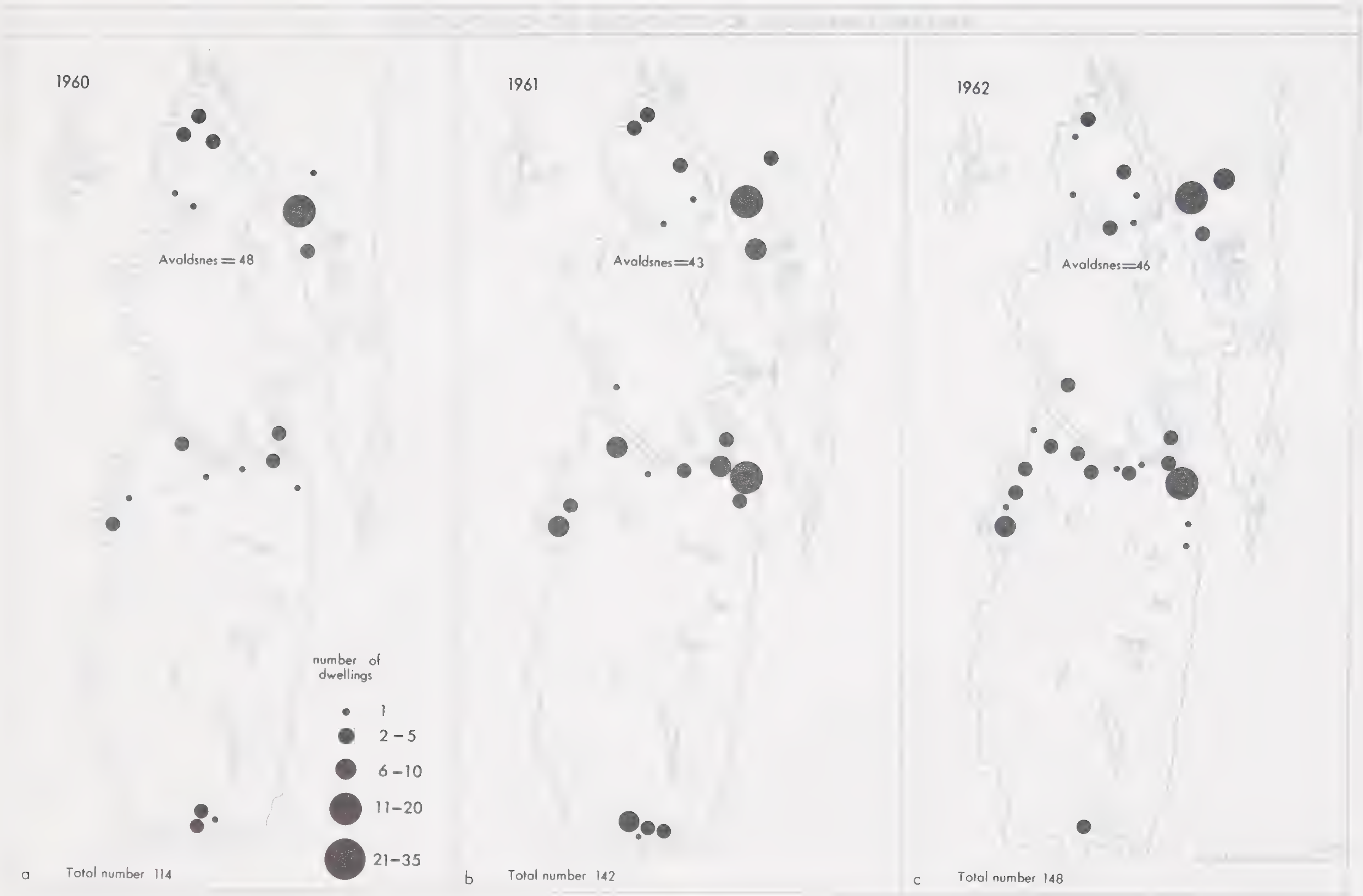
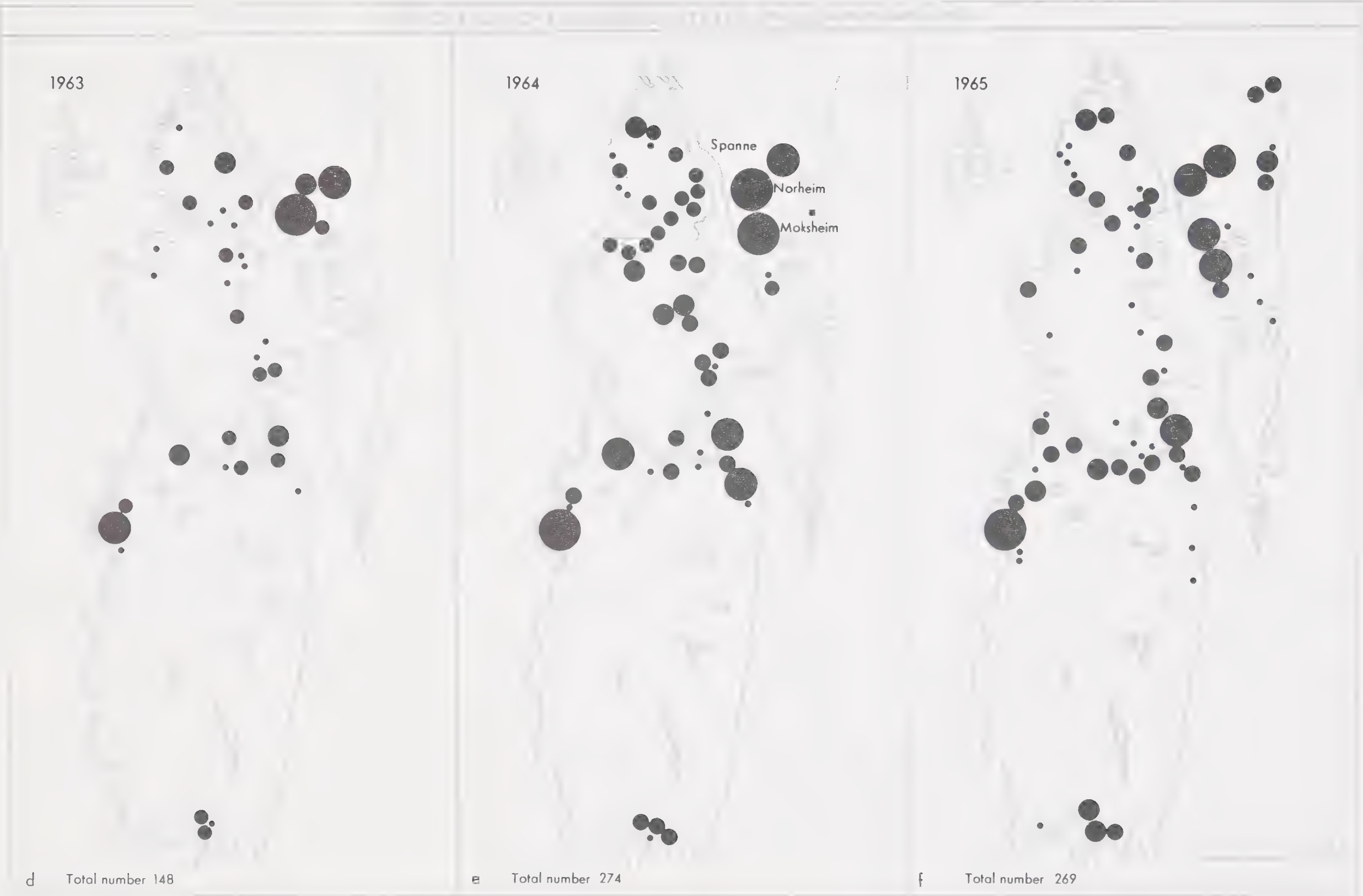
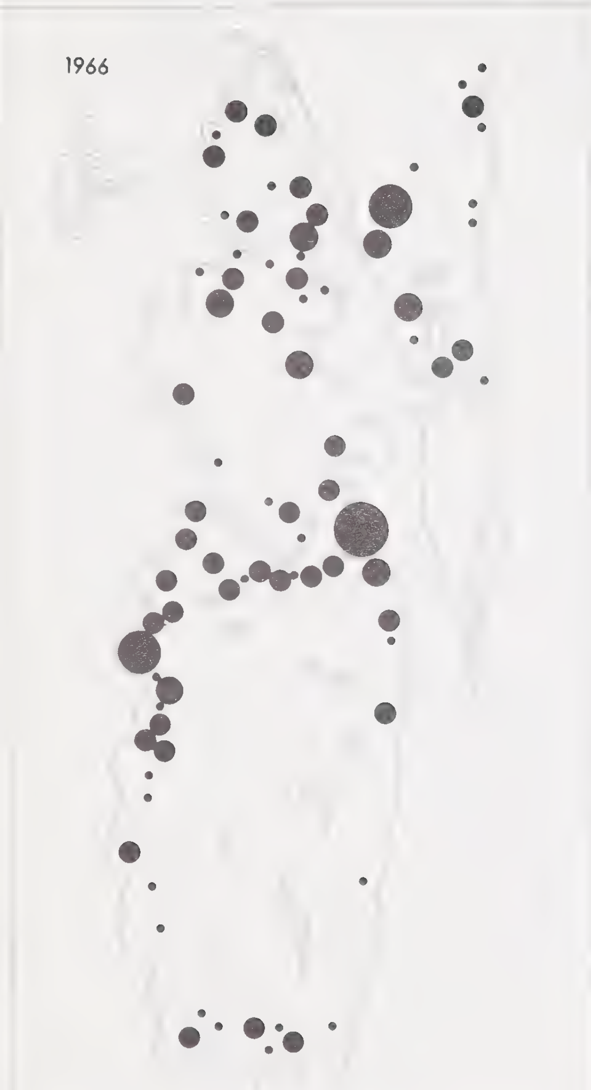

PROPOSAL FOR FUTURE EXPANSION BY ANDERSSON & SKJÅNES
Haugesund
Vedavågen
Kopervik
Åkrehamn
Ferkingstad
Sandve
Skudeneshavn
Population of existing business centres
25,000
5000
Future areas of expansion
0
5km.
Source Andersson & Skjånes

Figure 16



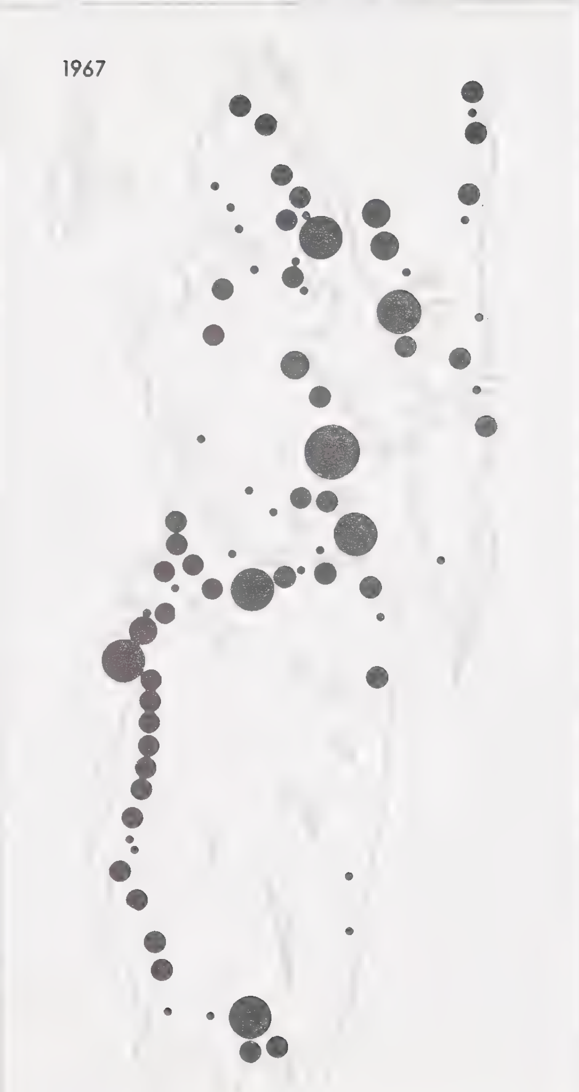
1960
Avaldsnes = 48
number of dwellings
1
2 – 5
6 – 10
11–20
21–35
a Total number 114
1961
Avaldsnes = 43
b Total number 142
1962
Avaldsnes = 46
c Total number 148


1963
d
Total number 148
1964
Spanne
Norheim
Moksheim
e
Total number 274
1965
f
Total number 269



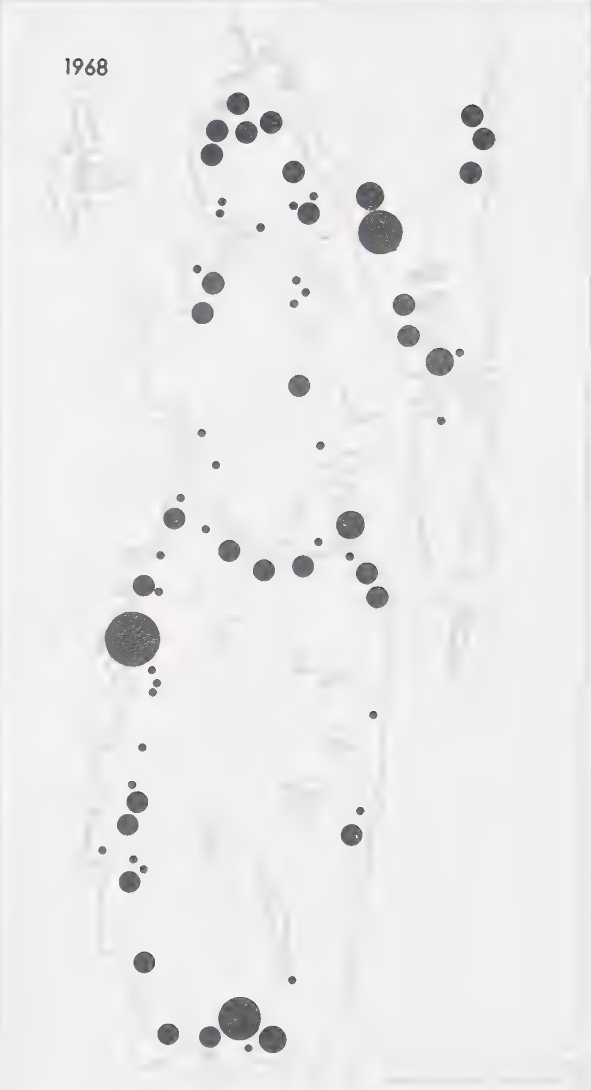
1966

g Total number 246



1967

h Total number 273



1968

i Total number 215 Source: Karmøy Bygningsråd

møy Bygningsråd (Building Council) between 1960 and 1968. Such applications do not necessarily mean that the single-family dwellings were actually constructed in the particular year of application nor do they mean that the buildings were constructed at all. However, in most cases, these dwellings were built and the results as tabulated are reasonably accurate.

The building lots are located throughout the commune but conform generally to the transportation arteries which, for the most part, parallel the coastline. Thus, the building pattern is dispersed and linear with the largest concentrations occurring in the already built-up areas such as the towns of Kopervik, Åkrehamn, Vedavågen, and Skudeneshavn. These localities have a service centre as well as the advantage of proximity to utilities, schools, etc. The greatest exception to this is the area in the northern part of Fastlandet just south of the commune of Haugesund. Here, in the locations referred to as Norheim, Moksheim, and Spanne, are new districts of single-family dwellings as a direct result of an out-migration from Haugesund. There is greater incentive for obtaining building lots in this location as opposed to Haugesund because such lots are in a more rural environment, have a more picturesque landscape, and yet are still within close proximity to the city of Haugesund. A shortage of building lots in Haugesund, especially for single dwelling units, also contributed to this phenomena. The areas of northern Fastlandet as well as many places on the island of Karmøy act as dormitory suburbs for Haugesund. Of the 4,996 wage earners in the commune of

Karmøy, 1,255 (25 percent) have their place of work situated in Haugesund.[4] Because Haugesund is an urban centre, the Building Council for Haugesund is observing the laws pertaining to housing construction more strictly and thus, there are more rigorous regulations affecting the construction and location of new housing. However, on Karmøy, people can more or less build in any location according to their own preferences although incentives are offered to building within locales conforming to those preferred by the planning officials. As a result, the greater desireability of building sites on Karmøy has resulted in an out-migration from the commune of Haugesund where the population has subsequently remained rather stagnant. A comparison of the population growth of Haugesund with that of Karmøy is represented in Figure 18. Within the next few years, Karmøy commune should surpass Haugesund commune in total population.

The above account is in contradiction to the views of O. Rønli of the Development Council that the increase in population has occurred on Karmøy rather than Haugesund exclusively on the grounds of Alnor.[5] However, the coming of Alnor did influence the building program and the settlement pattern. Most noticeable is the increase in the number of single-family dwellings which have been built since 1964. The average number built from 1960 to 1963 was 138 per year while that for 1964 to

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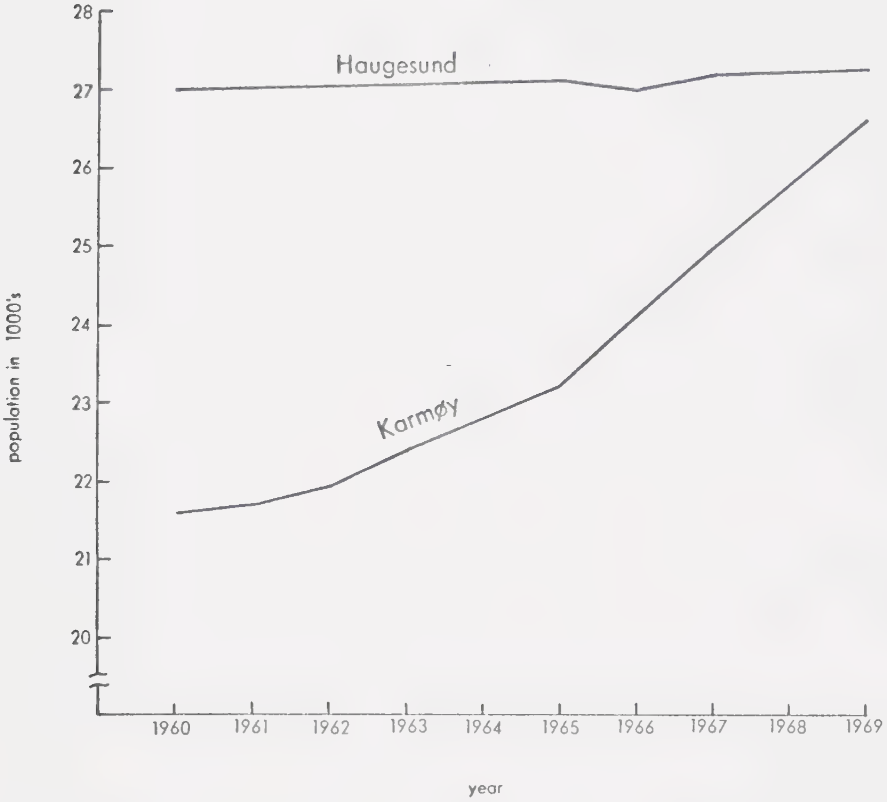
[4] Pers. comm. Elling Folkedal, Arbeidskontoret for Karmøy og Bokn, Kopervik.

[5] "Ølen, Etne, og Sveio må komme i regionalplanen for Nord-Rogaland." Haugesunds Dagblad. April 15, 1969.

Population of Karmøy and Haugesund, 1960-1969.



Sources: Karmøy Likningskontor og Folkeregister

Saertrykk. Sak nr. 65. Økonomisk oversikt for Rogaland fylke, 1968. Utbyggingsavdelingen, p. 501

Norges Offisielle Statistikk A.30 Folkemengden i Herreder og Byer. 1 January 1960-1968
Statistisk Sentralbyrå, Oslo

Figure 18

1968 was 255 per year or almost double. From 1963 to 1964 the number of applications for single-family dwellings jumped from 148 to 274.

To what degree was the building boom a direct result of Alnor employees "per se"? From the questionnaire it was found that 21 percent of the employees have moved into new homes since becoming employed in Alnor (from 1966 to July, 1969). This percentage represents approximately 184 single-family dwellings which is only 22 percent of the total newly built homes during the above stated time span. Therefore, the actual Alnor personnel are but partially responsible for the increased building activity in the commune. The building boom is a result of the higher average income which is in part due to Alnor, the house-building of Haugesund commuters, and the previous savings of people combined with optimism for the future of Karmøy.[6]

As expected, Alnor resulted in a considerable rise of Karmøy's income standard. This has increased markedly since 1963 when Haugaland had the country's lowest average income per inhabitant.[7] Within Karmøy, Alnor is the work place which gives the largest tax income to the commune. In 1968, Alnor paid out 25.7 million kroner in wages. This includes wages to employees paying taxes to other communes. Taxpayers in Karmøy received 19.8 mill. kr. (including sailors' tax). This means that Alnor employees in Karmøy received approximately nine percent of the total value for wage earnings in Karmøy. This amounted to 4.4 mill. kr. ($662,000) in taxes

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[6] Per. comm. Arne Gunnerud, Teknisk Etat, Torvastad, Karmøy.

[7] Haugesunds Avis. October 11, 1967.

and social insurance of which 2.6 mill. kr. ($400,000) went to the commune.[8]

The average income for personal taxpayers (taxable income) has risen substantially since the construction of Alnor, as shown by Table VII. This increased income is due largely to the fact that the average wage of Alnor employees (30,000-35,000 kr. per annum) is considerably higher than the average for the commune as a whole. However, the yearly percentage increase of the taxable income is currently levelling off. Thus, the income of Karmøy inhabitants will not continue to increase to the same degree as it has the past five years unless other industries are brought into the commune or the present industries such as Alnor expand.

The site of Håvik for the construction of Alnor was a good choice because it is in an area where there was a low individual income, poor employment, and out-migration. If the majority of the Alnor employees had not already been living within the immediate district, the rate of construction of houses would have been considerably higher.

Table VII - Average Income for Personal Taxpayers in Karmøy

	average income (in kroner)	% change
1964	12,404	+20
1965	14,817	+10
1966	16,348	+9
1967	17,822	less than 1

Source: Gudmund Frøiland, Karmøy Assessment Office. September 2, 1969.

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[8] Alnor Nytt. Nr. 1, 1969. p. 1.

Today, the planning officials on Karmøy are trying to concentrate building activity to develop a more favorable "milieu" with regards to the centralization of schools and other services as well as to the preservation of the agricultural land. During the past few years the commune authorities have purchased plots of land, divided them into lots, and provided the necessary services for the establishment of housing districts (Figure 19). In general, the selection of housing districts is such that the previous centres are given opportunities for natural growth. In addition, three or four smaller areas were purchased to satisfy the local demand for housing lots (in order to make allowance for political pressure to this end). The selection of land was based on the relative quality of the land. In this respect, factors such as orientation, view, vegetation and wind were given priority. The purchase of plots of land has in effect reduced the average price of land.[9] The commune buys at a low price and then sells to the home-owners. This partly sets a standard for the price of the lots. Certain benefits such as the provision of light, water, and sewage facilities are given to those who build in the locales which coincide with this plan. The scattered settlement pattern has also been partly due to the cheaper price of land in more remote areas as a result of speculative selling by individual landowners. However, if the home-owners decide to build in such locations, they must pay the extra cost of extending the utilities.

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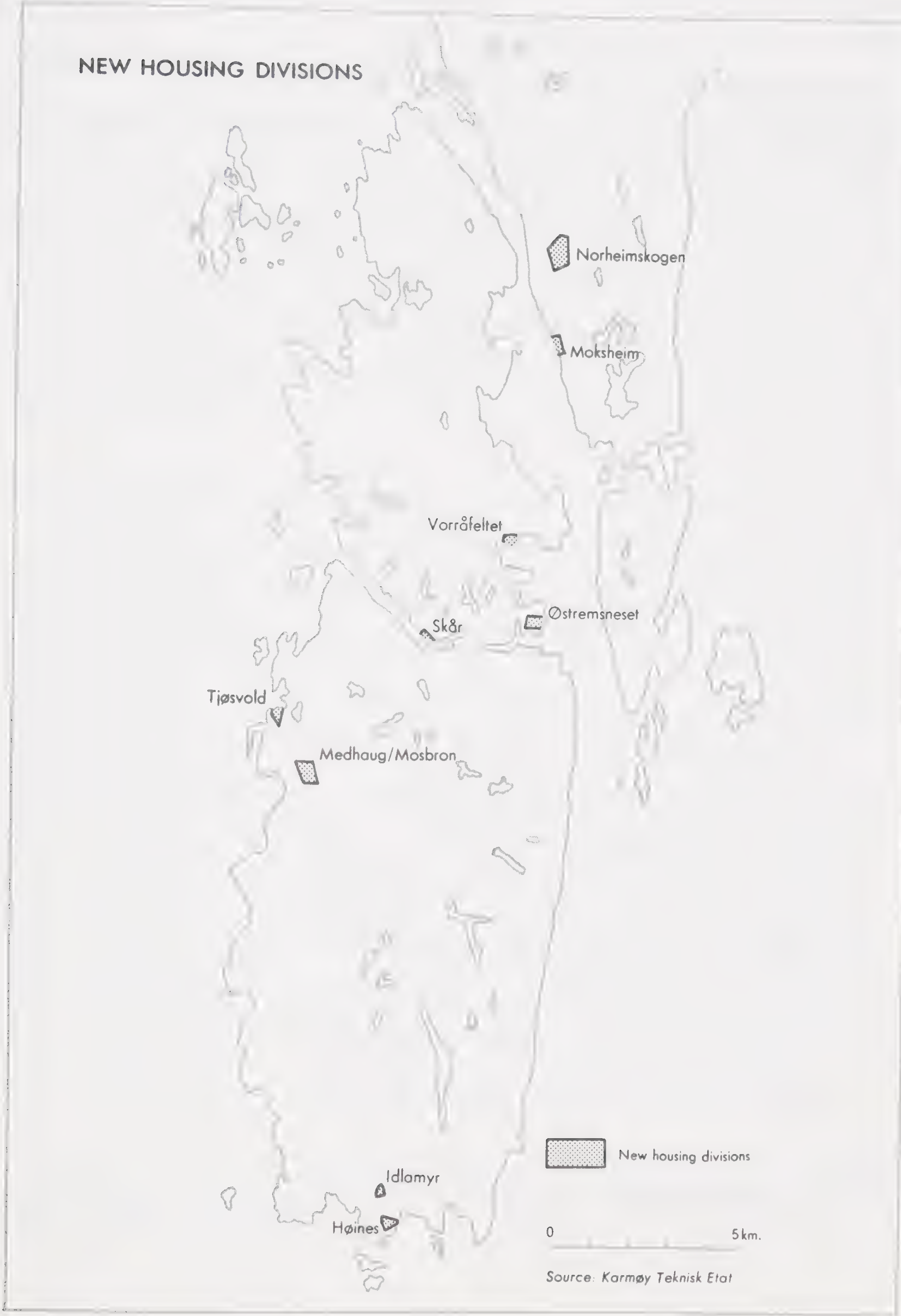
[9] Pers. comm. Arne Gunnerud. Teknisk Etat, Torvastad, Karmøy.



Source: Karmøy Teknisk Etat

Figure 19

Therefore, due to the present planning incentives and building programs, the proposals by Andersson and Skjånes are gradually being carried through on a day-to-day basis. Since the coming of Alnor, the scattered settlement pattern has not really changed but there has been a trend towards a concentration of new housing into specified areas. This, in turn, has reduced the opportunity for speculative selling. The expected change in the settlement pattern from rural to urban was not as pronounced as anticipated in the hypotheses.

Impact on business establishments and commercial activities

In 1964 when Jens Chr. Hansen wrote that a new town would come into existence at Karmøy[10], he was employing the old idea that a new aluminum plant in Norway meant the building of a new town. This, as already mentioned, did not occur because of the existence of a resident population and a labor reserve which minimized the need for an in-migration of employees to work at Alnor. Those who did migrate to the commune as well as those who could then afford to build new single-family dwellings were dispersed throughout Karmøy due to the planning concepts just discussed. Another major condition which discouraged the formation of an industrial town near Alnor was that this industrial concern was situated on the periphery of an already established service centre; in this case Haugesund. When there is a service centre and a labor force in existence in the

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[10] Jens Chr. Hansen, "Notodden". Norsk Geografisk Tidsskrift. Bind XIX 1963-64, Hefte 5-6, p. 286.

immediate vicinity, then smaller agglomerations with only a few stores will be established.[11] This is what has happened on Karmøy. It was expected by the local business authorities that numerous service industries would come to Karmøy but this has not been the case because Haugesund is the dominant service centre for the region. Haugesund is the business centre for North Rogaland, Sunnhordland, and parts of Outer Hardanger. In 1965 almost one-half of the retail turnover of 270 million kr. and over 60 percent of the turnover of daily merchandise went to people living outside the city.[12] This shows the degree to which these activities are centralized in Haugesund. Therefore, this city will profit from any expansion which takes place in its hinterland, i.e. Alnor on Karmøy.

In comparison to the increase of population from 1963 to 1968 (4,300) and the construction of single-family dwellings (1,425) during this same period, the expansion of Karmøy commune with regards to stores and other associated urban developments was disproportionately small (Table VIII). This was anticipated within the hypothesis but was due to an already established service centre rather than a sparsely populated hinterland. Expansion was limited to ten stores or businesses, eight factories or foundries, six schools, four warehouses, two kiosks and one hotel, bank, movie theatre, laundry, cafe, barbershop, and post office. On the other hand, there was a multitude of newly-built private garages (326) and gas

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[11] Per. comm. Jens Chr. Hansen, Norges Handelshøyskole, Bergen.

[12] Andersson and Skjånes A/S, Haugesund Generalplan. Haslum, October, 1966, p. V.

Table VIII - Building Applications in Karmøy, 1963-1968*

	Skudenes-Skudeneshavn	Åkrehamn	Kopervik-Stangaland	Avaldsnes	Torvastad
1963	1 repair shop 2 businesses	2 single-family dwellings with store 2 businesses 2 minkhouses	1 sheet metal workshop		1 business 1 school 1 warehouse 1 cement factory
1964	1 business	2 single-family dwellings with repair shop 1 vocational school 1 junior high school 2 gas stations 1 cafe 1 laundry 1 cold-storage warehouse	2 kiosks 1 movie theatre 1 junior high school	3 gas stations	

Table VIII - Building Applications in Karmøy, 1963-1968* (Cont'd)

	Skudenes-Skudeneshavn	Åkrehamn	Kopervik-Stangaland	Avaldsnes	Torvastad
1965	6 garages	4 garages	15 garages	3 garages	19 garages
	1 school	1 gas station	1 boarding school	3 huts	
				1 barbershop	
1966	10 garages	16 garages	8 garages	7 garages	24 garages
	2 huts	2 gas stations	1 hotel	1 business	1 carwash
		2 factories	2 automobile repair shops	2 gas stations	
				5 huts	
			1 warehouse office		
1967	14 garages	30 garages	28 garages	21 garages	16 garages
	1 factory	1 business	2 row houses	3 huts	1 school
	1 repair shop		4 huts	1 bank	
	2 huts		1 herring-oil factory	1 gas station	
				1 repair shop	

Table VIII - Building Applications in Karmøy, 1963-1968* (Cont'd)

	Skudenes-Skudeneshavn	Åkrehamn	Kopervik-Stangaland	Avaldsnes	Torvastad
1968	13 garages	22 garages	35 garages	13 garages	22 garages
	1 hut	1 warehouse	1 row house	2 huts	5 row houses
	1 clubhouse	7 communal dwellings			1 metal foundry
	1 cement foundry	1 cement-mixing shop			6 communal dwellings
	1 duplex				1 school pavilion
					1 post office
					1 office building

* Information incomplete for 1960-1962.

Source: Karmøy Bygningsråd, Teknisk Etat, Torvastad.

Total

326 garages
11 gas stations (1 car wash)
6 schools
1 theatre (movie)
10 stores or businesses
8 row houses
2 kiosk
1 hotel
1 bank

8 factories (1 herring-oil factory) & foundries (small)
4 warehouses
7 repair shops (2 specified as car repair)
13 communal dwellings
1 duplex
1 laundry
1 kafe

2 minkhouses
19 huts
1 clubhouse
1 barbershop
1 office building
1 school pavilion
1 post office
1 sheet-metal workshop

stations (11). This was probably a direct result of the increased average income per inhabitant and the dispersal of the population from place of work. Karmøy inhabitants have one of the highest ratios of cars to inhabitants in Norway and it is not surprising that their greater affluence is most noticeable with regards to car ownership aside from newly-built homes.

The effects of the proximity of the dominating retail centre of Haugesund are apparent. Since 1960, there has been a yearly increase of 11 percent in retail trade in Haugesund against 7.5 percent for the whole country and retail trade per inhabitant is almost double that of the Norwegian average.[13] Combining Karmøy and Haugesund for comparison, it is found that Haugesund has 53 percent of the population but 72 percent of the retail trade.[14] The percent of total work places in Haugesund against the total of its hinterland has increased since 1960.[15]

1960: 40.5%
1965: 41.3%
(projected) 1970: 43.0%

Haugesund's power of attraction as a service centre will probably continue to increase in the future. There is a retail trade trend today towards greater concentration in the towns and tettsteder (agglomerations greater than 200 inhabitants). On Karmøy there are two large and two smaller service centres: Kopervik-Skudeneshavn and Åkrehamn-Vedavågen

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[13] Loc. cit.

[14] Pers. comm. G. Valen, Rådhuset, Haugesund

[15] Andersson and Skjånes, op. cit., p. 52.

respectively. These four centres have daily merchandise stores and a few specialty stores together with service institutions. The distance to Haugesund, however, is short (20-40 km.) and transportation facilities are good, so Haugesund gets the larger bulk of sales. The centres on Karmøy are trying to better their position in relation to Haugesund so the planning officials are trying to increase the daily merchandise turnover of the towns by channelling the increasing population into nodal points near the existing central business districts.

Many of the stores and businesses which have come into existence since 1963 were needed even before the introduction of Alnor but Alnor provided the impetus which actually resulted in the construction of such buildings and the improvement of various services. This impetus is directly related to the increase in the average income and the increase in the commune tax and social insurance. For example, the need for a modern hotel had been noticeable through the years due to the growth of the tourist trade, but especially after the amalgamation of the communes and the building of Alnor.[16] The new bank in Kopervik was due to the Alnor construction workers on Håvik.[17] The movie theatre and office building complex which opened in 1968 and is also located in Kopervik would probably not have been built at such a size and cost if Alnor had not come.

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[16] Stavanger Aftenblad. April 27, 1968.

[17] Haugesunds Avis. October 6, 1966.

Impact on community services

The policy of siting industry in an area of small and dispersed population results in the employees having a longer journey to work. Thus, special transport is provided by the industry and increase in car ownership is as noteworthy as increase in house-ownership (reflected in the number of newly-built garages).[18] This is what has happened within the commune of Karmøy. Increased car ownership does, however, add to road congestion and therefore it is expected that one of the greatest sources of overloading of amenities will be in relation to existing transportation facilities.

Table IX shows the degree to which the community services on Karmøy are inadequate for the commune based upon replies of Alnor employees to the questionnaire. It should be noted that the greatest number expressing dissatisfaction with the existing services was just over one-third of the total. Health services were most often cited as cause for dissatisfaction, followed closely by hotels and housing facilities. Considering that there is only one doctor for 8,000 inhabitants for Norway as a whole,[19] it is not surprising that there has been added stress placed on the provision of health services. The housing, hotel, and school facilities have naturally had to expand but they must be keeping somewhat within the pace of the demand of the increasing population. The low percentage of dissatisfaction with stores has been explained previously

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[18] Dr. H.E. Bracey, Industry and the Countryside. Faber and Faber Ltd. London, 1963. p. 151.

[19] "Kommunal debatt om legemangelen på Karmøy". Haugesunds Avis. Dec. 2, 1966.

Table IX - Inadequate Community Services as Expressed by Alnor Employees

	number of respondents	% of total (149)
stores	15	10
housing	53	36
hotels	54	36
health services	57	38
schools	45	30
recreational facilities	43	29
means of transportation	6	4
movies, theatres, museums	39	26
other:		
improving road-net	42	28
restaurants	7	
sewage	7	
more work places	8	
playgrounds	6	

Source: Questionnaire

in discussing the influence of Haugesund's service centre. The extremely low percentage dissatisfied with transportation can best be explained by examining the various inadequacies cited under the term "other". A large number (28 percent) specified the inadequacies of the road network and/or traffic laws, speed limits, etc. in this category. Apparently, the "means of transportation" must have been understood by the respondents as the connections between the buses, boats, etc. rather than the transportation facilities themselves, i.e. the extent and the quality of the roads. If "road network" had been specified instead of "means of transportation", the percentage in this category would probably have been much higher. This is justifiable on the basis that the maintenance and improvement of the Karmøybanen with the aim of improving connections between Skudeneshavn and Haugesund is a prime concern of the planning authorities. The fact that no category was cited more than 38 percent of the time is an indication that the improvement and extention of existing community services has been somewhat successful in keeping pace with the demand. This is a direct result of the local recruitment of workers for Alnor and a minimization of in-migration together with the fact that Karmøy was already populated and had a surplus of labor.

A direct result from the siting of Alnor is the integrated waterworks plan. A fortunate result of the amalgamation of the communes was the subsequent cooperation in the development of an intercommunal waterworks. Åkra and Kopervik, which have their own waterworks, coordinated their systems with this intercommune works. The capacity of the works

is 18.5 million cubic meters of water a year of which 2.5 million is used for civilian consumption and the remainder is "industrial water" for Alnor (Figure 20). The total cost of 18 mill. kr. was paid mainly by the industrial concern (80 percent) and the remainder was paid by the commune. In the future, the waterworks will be built northwards from Håvik. This presents the possibility of extending the waterworks to service all of Karmøy, including Fastlandet. A negative factor in the extention of such an amenity was the increased cost of extending the pipes across an owner's land. In the past, any extension of facilities over or under someone's territory cost little if nothing at all. Now the land owners have realized what monetary rewards they can obtain from such activities.[20]

The coming of Alnor into the commune also initiated an influx of telephones. The south Karmøy telephone exchange was mainly manual but the lines soon reached their capacity. There developed a need for an automatic telephone exchange and likewise in Avaldsnes.[21]

Impact on land use

The land use of the commune of Karmøy for 1969 is represented in Figure 21. The largest area consists of heath interspersed with forest. This includes the interior of south Karmøy, the southwestern part of north Karmøy, and much of Fastlandet. The next largest area is agricultural land which generally coincides with the strandflat and parallels the

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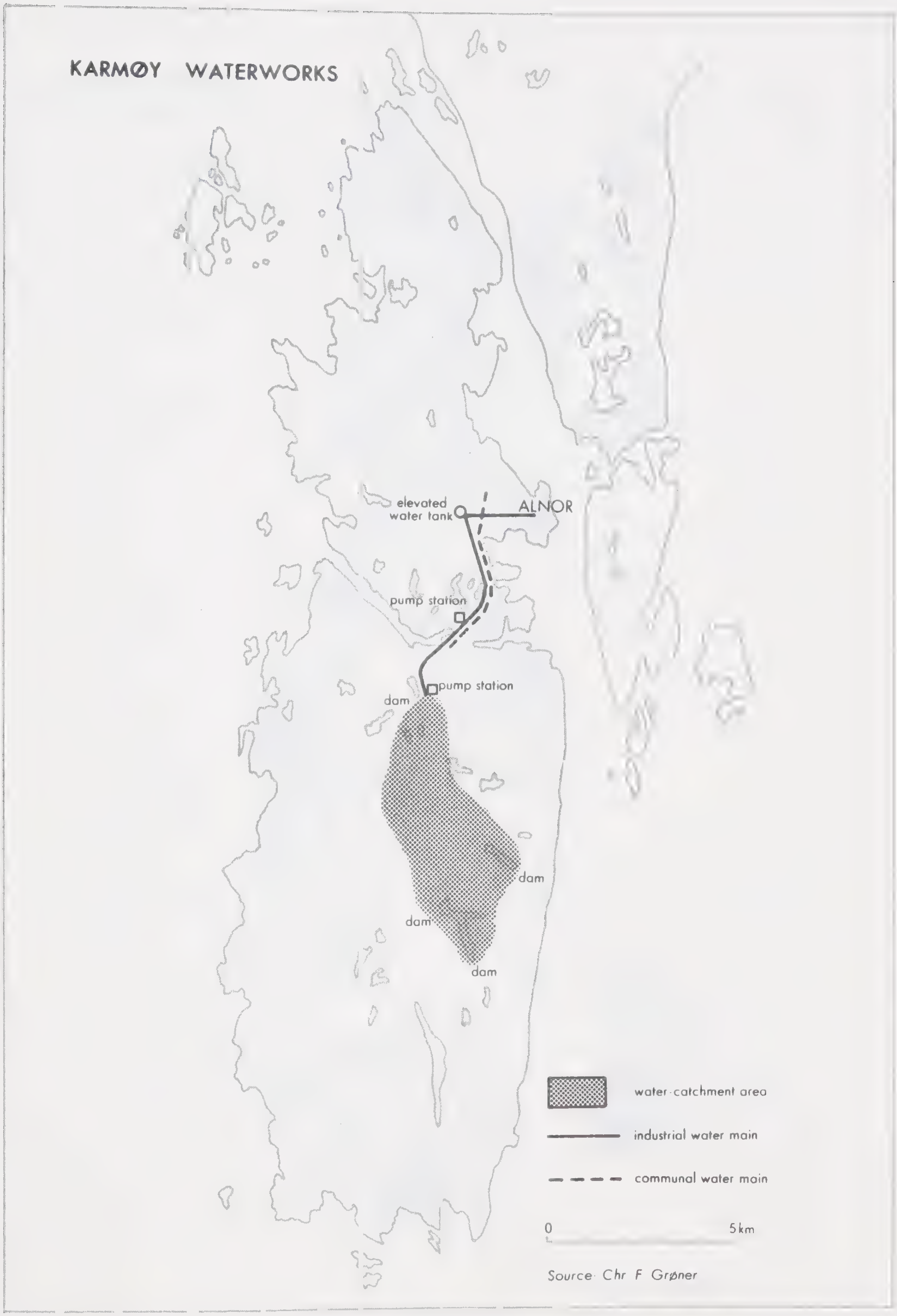
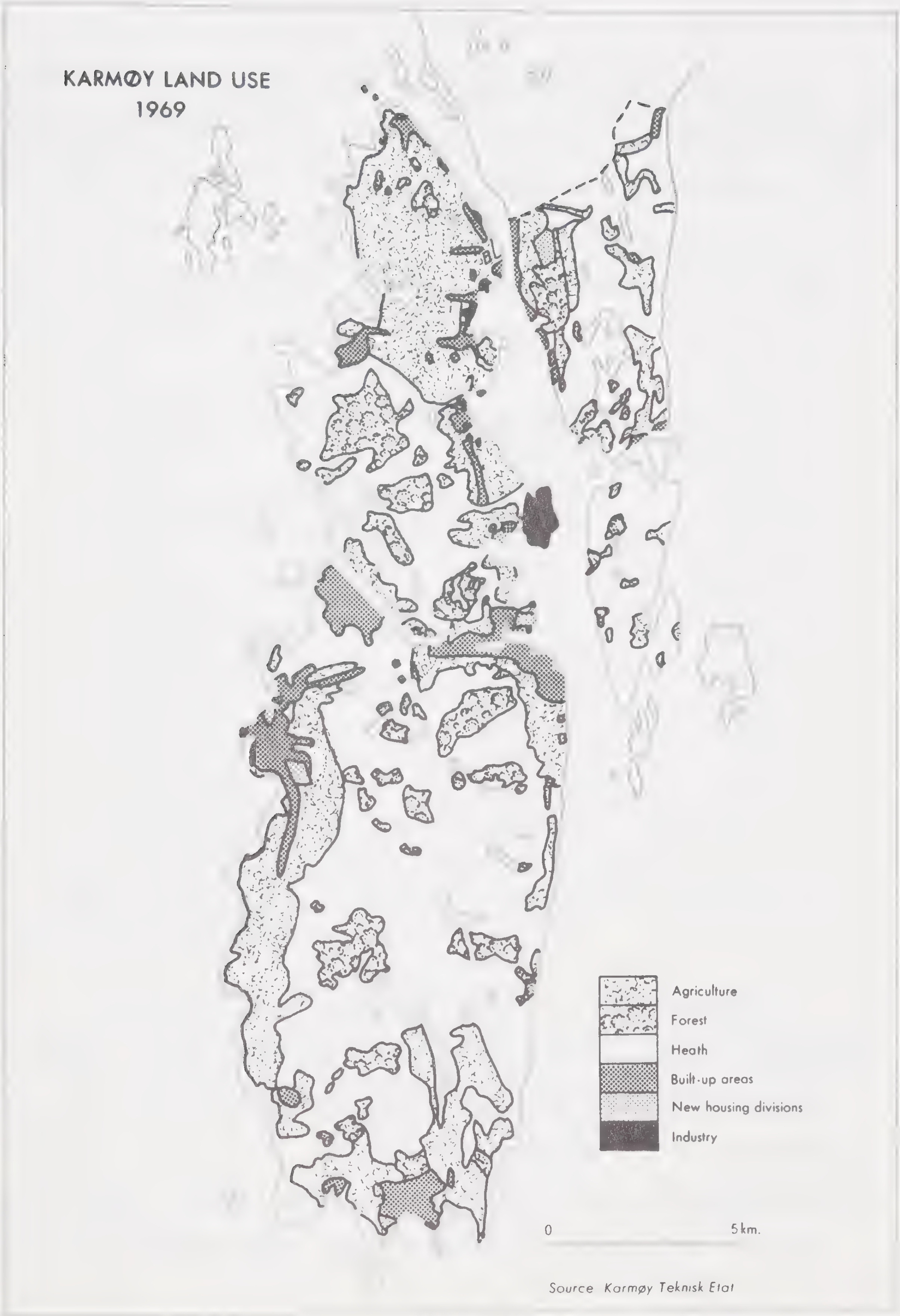
[20] Pers. comm. Arne Gunnerud, Teknisk Etat, Torvastad, Karmøy.

[21] "Karmøy-sentralene sprengt". Haugesunds Dagblad. July 19, 1967.



Source: Chr F Grøner

Figure 20



Source: Karmøy Teknisk Etat

Figure 21

coastline. With the expansion of industry and the construction of housing and transportation facilities, it can be expected that the agricultural area would diminish. Table X consists of comparable data relating to aspects of agriculture for the years 1959 and 1969; or, the decade which experienced industrial growth via Alnor and rapid urban expansion.

Table X - Aspects of Agriculture on Karmøy, 1959, 1969

	1959	1969
number of farms (greater than 2.5 acres)	1,034	880
cultivated land (in acres)	7,486	6,783
pasture land (in acres)	2,928	2,907
total agricultural area (in acres)	10,414	9,690
average farm size (in acres)	10.1	10.8

Source: Pers. comm. M. Førsvoll, Heradsagronomen i Sør-Karmøy og Kvitsøy, Kopervik.

The total area devoted to agriculture has decreased by 724 acres or 7 percent. Since a land use map for 1960 is unavailable for comparison, the areas experiencing a land use change and/or the expansion and reduction of agricultural land can not be shown. From field observation, it was noted that the new housing districts were sited essentially on rocky, uncultivable soil. This is directly related to the planning

policy regarding the preservation of the agricultural land. In the future, it is expected that agricultural land will be important and will increase in value. Therefore, the present expansion of housing is playing a minor role in decreasing the amount of arable land. What loss there has been due to the expansion of the commune facilities was probably partly neutralized by an expansion of the fields.

The greater diversity in the ten year period exists in the total number of farms greater than 2.5 acres. There has been an amalgamation of farms due to mechanization since farming on Karmøy is becoming an uneconomical livelihood in itself. The decrease in the total number of farms (154) has increased the average farm size. This increase, however, has only amounted to an average of 0.7 acres per farm and therefore, the average farm size (10.8 acres) remains small and the problems of farm management have not changed - mechanization is impeded by the expense and the sub-division and small size of the fields.

The industrial area has increased significantly through the building of Alnor in proportion to what it was previously (small fishing industrial concerns). However, in proportion to the area of agricultural land and the built-up area, it remains small.

In essence, the settlement patterns have not really changed over the last decade although there is a trend towards expansion at nodal points throughout the commune. Settlement continues to expand in a linear fashion and the scattered settlement pattern is maintained. The increase in population and the expansion of the built-up areas has imparted a more urban character to the Karmøyan landscape.

Impact on the Karmøy labor force

The subject matter of this chapter has been concerned with the impact of Alnor on population and migration, settlement, business establishments and commercial activities, community services, and land use. To what degree has this in turn affected the structure of the labor force in the commune of Karmøy? Table XI compares the number and the proportion of the Karmøy labor force in 1960 with that of 1968.

Table XI - Karmøy Labor Force, 1960, 1968

Livelihood	1960	%	1968	%
Farming	1127	14.0	596	7.1
Fishing	1461	18.1	975	11.6
Industry	1465	18.2	2570	30.7
Building and construction	720	8.9	710	8.5
Commerce	727	9.0	619	7.4
Sea transport (including (shipping abroad)	1664	20.6	1950	23.3
Services	904	11.2	953	11.4
Total	8068	100.0	8373	100.0

Sources: Andersson and Skjånes, Karmøy Prinsippforslag til Generalplan. Haslum, November, 1965. Tabell 3.

Arbeidsdirektoratet, Oslo.

The number employed in the primary activities of farming and fishing has declined considerably whereas that engaged in industry has almost

doubled. The total labor force has only increased slightly (3.8 percent) because the fishermen and farmers shifted their livelihoods to one based on industry and continued to live in their individual locales. The rapid increase in the proportion engaged in industry is due mainly to the Alnor concern. The number engaged in industry has increased by 1,105 and this is somewhat greater than the number working in Alnor (878). Commerce has declined because of the enlargement of Haugesund as a service centre and as a nodal point for commercial establishments in the Haugesund peninsula.

Services have had a small growth because of the already existing community facilities. Building and construction has returned to the same level after having doubled during the time of the construction of the plant. Aside from industry, the number employed in sea transport (including shipping abroad) was the only other livelihood which experienced any appreciable increase numerically as well as proportionately.

The character of the labor force has shifted from one which was divided essentially between four different sources of livelihood in 1960 (sea transport, industry, fishing, and farming), to one which is dominated by two sources of livelihood (industry and sea transport).

CHAPTER VI

CONCLUSION

The impact of Alnor Aluminum A/S on Karmøy has differed significantly from the hypotheses outlined in the introduction. It was anticipated a "company-town" might develop along with the new industry; no such development occurred. The shift in settlement patterns from rural to urban was not pronounced. A small growth of service industries did not result from a sparsely populated hinterland. The necessity for an improvement and extension of the transportation facilities and community services was less than expected. The increase in population and building activity was only partly due to the Alnor labor force.

As opposed to other electro-industrial communities, Karmøy and environs already had a large resident population and was in close proximity to a large, accessible service centre. No "company-town" developed with the new industry because recruitment of labor from the vicinity involved a district which had a surplus of labor due to the decline of fishing and the mechanization of farming. Since the topography was no major deterrent to the building and maintenance of transportation facilities, employees continued to live in their former dwellings and commuted to work daily. Thus, the commuter field of the aluminum plant was extensive in contrast to the pattern of other plants. In previously existing electro-industrial communities, the commuter field was limited because of the confining nature of the mountainous topography and the small area of flat land at the heads of the fjords. Recruitment of labor in these communities was essentially from outside the region because of the small local population and labor force so the in-migration which

followed industrial development resulted in the building of a completely new town.

Another factor discouraging the development of an associated urban district was the prevalence of the dominant commercial centre of Haugesund. Within Karmøy, the growth in the service industries is low relative to the growth in employment and population but is not a result of a limited hinterland. All of Karmøy is within the service omland of Haugesund, whose stores and specialty shops dominate the retailing activity in the Haugesund peninsula. Therefore, the need for stores and their development on Karmøy has been limited.

The third major factor which hampered the building of an industrial town near Alnor was psychological. The concept of seven separate communes on Karmøy remained firmly fixed in the minds of the people. Politicians and inhabitants were primarily concerned with their own individual locale. Therefore, there was general agreement that any new growth would be dispersed throughout the island. In this manner, it was felt that everyone could benefit from the new developments associated with Alnor. The six main service centres on Karmøy would maintain a share of the increased merchandise turnover. Likewise, the dispersal of the population growth could benefit private landowners throughout the island because of the opportunity for speculative selling.

The shift in settlement patterns from rural to urban has been impeded due to the preference for a scattered settlement pattern. The new housing districts, however, are located adjacent to the existing

towns and tettsteder, and the population increase has been diverted somewhat to specific pre-existing nodal locations. In this way, the planning officials could improve the daily merchandise turnover of the main service centres on Karmøy.

The land use of Karmøy did not change significantly over the past decade because of the continuation of the dispersed settlement pattern, the preservation of the agricultural land, and the factors discouraging the building of an industrial town. Alnor was built in an environment which already had most of the facilities and personnel required for the construction and operation of the plant. The building boom which did accompany Alnor's construction was a result of the positive prospects for economic growth and expansion, as envisioned by the Karmøy inhabitants, along with the house-building of Haugesund commuters, rather than the Alnor employees.

The impact of Alnor was not altogether dissimilar from the hypotheses. There was a change in the planning and administration of Karmøy. Agriculture and fishing became less significant as the size and mix of the labor force focused on industry. In general, the initial positive prospects for economic growth and expansion have been followed by a period of slower growth.

One of the first significant changes related to Alnor was the shifting of the administration boundaries at the municipal level of government. The seven communes which previously existed wholly, or in part, on Karmøy were amalgamated into one commune which encompassed the greater

segment of the Alnor commuter field. This was deemed necessary to minimize difficulties that otherwise would have been encountered in the former complex administrational setup - varying tax structures, diverse planning policies, overlapping commune services, etc. A single general plan would improve the efficiency of provision of such intercommunal interests as transportation facilities, electricity, and the prospective waterworks plan associated with Alnor.

The labor force on Karmøy shifted from one dominated by the four livelihoods of sea transport, industry, fishing, and farming to one focusing on industry and sea transport. Alnor is not the only industry in the immediate vicinity although it employs the greatest number of workers and the largest proportion of the industrial work force within the commune (about sixty-two percent). However, the Alnor employees residing in the commune of Karmøy receive only nine percent of the total wage earnings in the commune. The livelihood of the population has changed its focus but this has helped to stabilize the economic base of the commune - the number dependent on the seasonal primary industries of fishing and farming has declined. Median family income has increased. The average wage of Alnor employees is about twice the average wage for the commune inhabitants as a whole. The increased wealth materialized into single-family dwellings and cars, with an associated rise in the number of private garages, and service stations.

The prospects for economic growth and expansion were promising but now appear to have been overly optimistic. Local inhabitants and officials seemed to be under the impression that Alnor would solve such

commune problems as unemployment and out-migration. They failed to realize that these improvements would be only temporary. Since completion of the construction of the plant and commencement of the production of aluminum, the rate of growth and expansion of Karmøy declined as the initial expansion subsided. It appears that Karmøy is entering the final phase in the cycle of the electro-industrial community which is characterized by slow growth and stagnation. However, the situation on Karmøy is different from the majority of electro-industrial communities on the west coast of Norway. Its economic base is more diversified and there is the possibility of expansion. The introduction of other industries associated with, or different from, Alnor seems probable because of the availability of labor, the proximity of a sizeable service centre, the existence of community facilities and services, and other advantages.

> "The prospects for further development at Karmøy are good. The investments made in power transmission and distribution facilities, dock and material handlings systems, and other infrastructure mean that the aluminum reduction capacity can be increased relatively cheaply. The possibilities that associated industries will be developed should be quite good both in the fabricating field and eventually, also for the refining of raw materials. When planning future ventures, Norsk Hydro will take into account that they already are established at Karmøy and control 1.6 million square meters of land in addition to the area allocated to Alnor.
>
> Apart from a planned expansion in the production capacity of Alnor by twenty-five percent, Norsk Hydro has no other definite plans for further development at Karmøy. From what is indicated above, however, further expansion of Alnor is likely to take place in the not too distant future. It should also be mentioned that Karmøy is a possible location for a future alumina plant."[1]

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[1] Pers. comm. Anders Ringnes, Norsk Hydro, Oslo.

The commune officials must now decide whether they prefer a more industrialized commune or the more serene atmosphere associated with fishing and farming. The preservation of the traditional character of Karmøy was a point of consideration when Alnor was built. Alnor has definitely been an economic asset and has also tried to become incorporated into the "milieu" on Karmøy without overwhelming or changing the basic character of the island. In contrast to the other electro-industrial communities, a regional transformation was not necessary. It was possible to maintain the broad regional population distribution virtually unchanged. Nevertheless, the introduction of a large industry to the countryside does change and influence the locale.

> "The basic character of Karmøy is changing and will continue to change in the future. This is not only due to Alnor but also to the construction of Karmsund Bridge in 1954 which connected Karmøy to the Norwegian mainland. In the future, the people and the environment will be more urbanized."[2]

The siting of Alnor did not conform to the familiar pattern of location for the typical electro-industry on the west coast of Norway. The hydroelectric power was transmitted almost eighty kilometers to the site rather than choosing a site closest to the source of power. This was a new development in the history of the electro-industrial communities in Norway. The placement of the industry within an already populated community negated the necessity for a new "industrial" town and helped to bolster the economic base of an otherwise faltering community. In the future, it can be expected that attempts will be made to repeat these

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[2] Arne Gunnerud, Teknisk Etat, Torvastad, Karmøy.

location features. However, there are few areas like Karmøy which already have a substantial resident population, a large accessible service centre, relatively good transportation facilities, flat land, and access to hydroelectric power developments. Therefore, the siting of Alnor on Karmøy and the impact that followed are somewhat unique.

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APPENDIX

Explanation of Sampling Technique

The questionnaire was written in Norwegian and mailed to 298 of the 878 Alnor employees. The 298 recipients were randomly selected from the Employee Report of May 31, 1969 (with the use of random sample tables). The Employee Report was a list of all Alnor employees. Two hundred and ninety-eight questionnaires were distributed so that, with a probable 30 percent return, a ten percent sample of the Alnor work force would be obtained. A stamped, self-addressed envelope was included along with the questionnaire. A 50 percent response to the questionnaire was in fact received. Therefore, 17 percent of the Alnor work force was included in the sampling analysis. An English translation of the questionnaire appears along with the original questionnaire.

QUESTIONNAIRE TO ALNOR EMPLOYEES

I am a student of Geography at the university in Edmonton, Alberta, Canada, and will use this questionnaire in a study concerning Alnor Aluminum Norway A/S' influence on the commune of Karmøy.

It will be of great help to me if you are willing to answer the questions below, and I request that you fill out the form as soon as possible and place in the enclosed reply envelope. The answers will be handled confidentially. Please print.

In advance, thank you.

Yours truly Ray Towle

---

1. a) Age ______ (mark with an "x")
   b) Male ______ Female ______ " " " "
   c) Single ______ Married ______ " " " "

2. a) Address. (If you live on a farm, give the direction and distance in kilometers from the nearest town.) ______________________________

   ____

   b) How far is it in kilometers from Alnor to your residence? ________
   c) In what year was your house built? ____________

3. a) What employment did you have before you began working with Alnor?

   ____

   b) Where did you live when you had this employment? (If you lived on a farm, give the direction and distance in kilometers from the nearest town.) ______________________________

   c) If 3.b) is not the same as 2.a), why did you move? ______________

   ____

4. a) Why did you quit your previous job and begin working at Alnor?

   ____

   b) How long have you worked at Alnor? ______________________________

   c) How do you travel to Alnor?
   (i) walk ______
   (ii) car ______
   (iii) bus ______
   (iv) bicycle/motorcycle ______
   (v) boat ______
   (mark with an "x")

4. d) How long does it take to travel to Alnor from your place of residence? ____________

5. In which section do you work? ______________________________

6. What education do you have? (Mark with an "x")
   (i) grade school ____
   (ii) junior high school ____
   (iii) high school ____
   (iv) technical school ____
   (v) technical high school ____
   (vi) other, specify ____
   ____
   ____

7. Which community services do you think are inadequate for a commune of Karmøy's size? (Mark with an "x")
   (i) stores ____
   (ii) housing ____
   (iii) hotels ____
   (iv) health services ____
   (v) schools ____
   (vi) recreational facilities ____
   (vii) means of transportation ____
   (specify) ____________
   (viii) movies, theatres, museums, etc. ____
   (ix) other, specify ________

8. What changes or improvements do you think would be desireable in Karmøy and/or your own locality?

____

SPØRRESKJEMA TIL ANSATTE I ALNOR

Jeg er geografistudent ved universitetet i Edmonton, Alberta, Canada, og vil bruke dette spørreskjema i en studie av ALNOR Aluminum Norway A/S' innflytelse på Karmøy kommune.

Det vil vaere til stor hjelp for meg om De er villig til å svare på nedenstående spørsmål, og jeg tør be om at De fyller ut skjemaet så fort som mulig og legger det i vedlagte svarkonvolutt. Svarene blir behandlet konfidensielt. Vennligst bruk trykte bokstaver.

På forhånd takk.

Hilsen Ray Towle

---

1. a) Alder _____ (Sett kryss)
   b) Mann _____ Kvinne _____ " "
   c) Ugift _____ Gift _____ " "
   d) Antall familiemedlemmer (inkl. Dem selv)

2. a) Adresse. (Hvis De bor på en gård, oppgi retning og avstand i km fra naermeste by). ____________________

   ____

   b) Hvor langt er det i km fra ALNOR til Deres hjemsted? __________
   c) I hvilket år ble Deres bolig bygget? __________

3. a) Hva slags arbeid hadde De før De begynte i ALNOR? __________

   ____

   b) Hvor bodde De da De hadde dette arbeid? (Hvis De bodde på en gård, oppgi retning og avstand i km fra naermeste by). __________

   ____

   c) Hvis 3.b) ikke er det samme som 2.a), hvorfor flyttet De?

   ____

4. a) Hvorfor sluttet De i Deres forrige arbeid og begynte i ALNOR?

   ____

   b) Hvor lenge har De arbeidet i ALNOR? ____________________
   c) Hvordan reiser De til ALNOR?
   (i) går til fots _____ (iv) sykkel/motorsykkel _____ (sett kryss)
   (ii) bil _____ (v) båt _____
   (iii) buss _____

4. d) Hvor lang tid tar det å komme til ALNOR fra Deres hjem? __________

5. I hvilken avdeling arbeider De? ____

6. Hvilken utdannelse har De? (Sett kryss)

(i) folkeskole ______
(ii) realskole ______
(iii) gymnas ______
(iv) teknisk skole ______
(v) teknisk høyskole ______
(vi) andre, nevn saerskilt ______
____
____

7. Hvilke samfunnstjenester synes De er utilstrekkelige for en kommune på Karmøys størrelse? (sett kryss)

(i) butikker ______
(ii) boliger ______
(iii) hoteller ______
(iv) helsetjeneste ______
(v) skoler ______
(vi) fritidsmuligheter ______
(vii) transportmidler (spesifiser)___
____
(viii) kino, teater, museer o.l. ______
(ix) andre, nevn saerskilt __________

8. Hvilke forandringer eller forbedringer mener De ville vaere ønskelige i Karmøy og/eller Deres egen bygd?

____

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